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THE CORRELATION BETWEEN THE DEVELOPMENT OF THE GROWTH AND THE SYMPTOMS OF CARCINOMAS OF THE UTERINE CERVIX*

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THE surgical and radiologic methods of treatment of carcinomas of the uterine cervix have been technically so perfected that further improvement can probably not be expected. The five-year absolute good end-results obtained with the present treatment vary from 20 to 25 per cent in the different clinics. The material unfortunately comprises a high percentage of advanced cases.

It is an undeniable fact that the percentage of good end-results varies inversely with the extent of the growth. The relative curability in the beginning, clearly localized cancers is about 75 to 90 per cent; in the doubtfully localized cancers about 35 to 50 per cent; in the cases involving the parametrium but retaining a fair degree of mobility about 10 to 25 per cent; and in the terminal, disseminated and fixed cancers zero. About 20 per cent of the total number belong to the first two groups and these show about 60 per cent of all the absolute cures, while about 80 per cent are seen in the last two groups, and these include only about 40 per cent of the good end-results. Improvement in the control of cancer obviously can only come from an earlier diagnosis and an institution of the indicated treatment without any delay. The avoidable delay in the treatment and the difficulties of the early diagnosis are responsible for the poor end-results of treatment. Indolence of the patient and negligence of the physician are only contributary causes. The control of cancer depends solely on early diagnosis and treatment.

Early diagnosis is an arduous task on account of the absence of

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symptoms in the beginning growth and the difficulties in the discovery of the beginning carcinoma nodule. All tumors must grow to some extent before giving symptoms. Could the cancer be diagnosed during the symptomless stage then control would be assured. If the physician would learn always to think of the possibility of the presence of a malignant growth and to study the macroscopic and microscopic characteristics, the extent of the growth development and the course of signs and symptoms, then early diagnoses would soon be made.

In an attempt to facilitate a study of early diagnosis an endeavor has been made to correlate the development of (1) the macroscopic appearance, (2) the microscopic findings, (3) the growth, and (4) the signs and symptoms. If one has observed a great number of cancers, then it appears that there is, as a rule, an orderly sequence in the developmental progress of a tumor from the beginning to the terminal stages in the four characteristics mentioned. The following facts also are generally conceded: (1) that cancer does not start in healthy tissue or organs; (2) that cancer begins in a spot or focus, the cells of which at first are not malignant; and (3) that chronic irritation causes this spot or works on this spot and produces the changes characteristic of malignancy.

THE MACROSCOPIC FINDINGS

The macroscopic picture of cancer varies depending on the type of growth, whether endophytic or exophytic. The sequence of changes in the endophytic type are nodule, ulceration, necrosis and finally sloughing with crater formation; while in the exophytic type the changes are nodule, papilloma, cauliflower growth with necrosis and finally sloughing with crater formation.

The cancer nodule is recognized with difficulty because benign nodules are more frequently seen than malignant nodules. It cannot be diagnosed by inspection or palpation. They do not cause symptoms. The Chrobak-Clark sign may be presumptive. If a nodule is touched with a dull pointed object and bright red blood appears and the arterial bleeding continues for some time, then one may presume that cancer is probably present. But a positive diagnosis rests on an immediate diagnostic excision within the surrounding healthy tissue of the nodule and an immediate frozen section diagnosis. Procrastination by observation must never be practiced.

The cancer ulcer and papilloma are, also, difficult to diagnose, because ulcers and papillomas are more frequently benign than malignant. The ulcer results from the peculiar tendency of the central carcinoma cells in the nodule to degenerate due to the poor blood supply. The papilloma tends to grow outward, but here also the central cells degenerate and early become friable. Such small ulcers and papillomas bleed when touched. This "contact bleeding" is the first symptom of cancerous tumors. A diagnostic excison should be made within the healthy tissues

followed by an immediate frozen section diagnosis to rule out or in malignancy.

Necrosis is manifested by friability of tissue. The growth now has the consistency of brain substance. The examining finger on withdrawal may bring out sufficient material for microscopic examination to corroborate the clinical diagnosis. The periphery of such tumors is indurated, nodular and clearly invades the adjacent tissues. Arrosion of blood vessels causes spontaneous hemorrhages, while the necrosis produces discharge.

Crater formation is an evidence of the extensive sloughing of the necrotic and friable tumor particles. The walls of such craters are irregular and indurated. The crater formation is indicative of an advanced stage and is almost invariably associated with wide dissemination into and fixation of tumor to the pelvic fasciae and bones. Pain is added to the symptoms of hemorrhages and discharge. It always signifies an invasion of the deeper pelvic structures or the adjacent organs by the cancer.

When cancer arises in situations not easily accessible to microbes it is a chronic disease and may not destroy the patient's life for many years. Cancer in protected sites often grows silently and unsuspected; but when it arises in situations easily accessible to putrefactive bacteria, for example in the alimentary or genital tracts, the primary lesion is readily colonized by bacteria. Such sequences soon manifest themselves and may speedily destroy the patient. The virulence of cancer, as a rule, depends not alone on the malignant character but also on its septicity. Putrefactive microbes are the common cause of failure in attempts to relieve cancerous patients by gross surgical and radiologic methods.

THE MICROSCOPIC CHARACTERISTICS

The histologic characteristics of a carcinoma in the sequence of their appearance are: (1) the atypia or anaplasia of the epithelial cells; (2) the invasion or breaking through of the basement membrane; (3) the destructive tendencies in displacing or assimilating normal tissues and cells; and (4) the formation of metastases either by continuity into the adjacent tissues and organs or by emboli either in the regional lymph nodes or distant sites. The microscopic diagnosis does not depend on the presence of all these factors. A diagnosis of cancer is justifiable without the evidence of metastation, it is still valid without the presence of destruction, and it is warranted in the absence of invasive tendencies. Early carcinoma is present when atypia or anaplasia alone are seen. The latter is characterized by a blurring of the cell mass, a down-growth of the epithelium with preservation of the basal layer, an abnormal behavior in staining qualities and an irregularity in the shape and size of the cells and the nuclei and a loss of polarity. Beneath the basal membrane and in contact with this new epithelium is an acute inflammatory exudate.

In the next step of development the round cells may break through the basal layer in places and thus come in actual contact with the most recently produced epithelial cells. The basal layer has failed in its protective function.

These atypic or anaplastic changes present the earliest evidence of the incidence of cancer in the human subject. This according to Bailey and Schiller is the moment of change from benign to malignant, the Cancer Phase. What proceeds thereafter does so in spite of any additional external factors which thenceforward are present, and is, in itself, progressive and inevitable.

Microscopic examinations of tissues removed by biopsy or by amputation of the cervix require serial sections if one expects to find evidences of cellular atypia or anaplasia. Otherwise it would be impossible to find very early carcinomas. It, also, precludes the treatment of suspiciously looking chronic cervicitides with the electric cautery, as the method might destroy such beginning cancerous foci. Therefore we are more and more inclined not to use the cautery method but to employ minor surgical procedures to obtain tissue for microscopic examination. Thereby one is placed in a position to rule out or in malignancy.

THE EXTENT OF THE TUMOR

The extent or growth development is determined by a general physical examination and a special pelvic examination. The latter comprises inspection by speculum and endoscopes, bimanual vaginoabdominal and rectoabdominal palpation, instrumental palpation with sound or curette, and eventually x-ray diagnostic procedures. Thereby the location and size of the growth, the condition of the parametria and adjacent organs such as vagina, bladder, and rectum, invasion of the regional lymph nodes and distant metastases are ascertained.

The following questions should be answered:

1. *Is the cancer clearly localized?* Such a beginning nodule should have a diameter of about 1 cm., should be clearly limited and freely movable within the cervix. The entire uterus possesses normal consistency, elasticity and mobility.

2. *Does doubt exist as to the absolute localization?* Such a tumor may have already spread to one-half of the cervical wall. It is surrounded by an area of inflammatory reaction enclosing dendritic processes of carcinoma tissue. The area is reddened, edematous and of doughlike consistency. Mobility of the uterus is impeded due to loss of elasticity of tissue, especially of the paracervical connective tissue.

3. *Are the parametria or regional lymph nodes involved and are the invaded structures mobile or fixed?*

4. *Have metastases or extensions occurred to bladder, vagina and rectum?*

5. *Has distant metastasis taken place?*

The answer to these five questions permits of a clinical grouping as follows: Group 1, the clearly localized growth; Group 2, the doubtfully localized growth; Group 3, the invasive growth; the invaded parametria or lymph nodes are movable; and Group 4, the disseminating and fixed growth including (a) the frozen pelvis; (b) invasion of bladder, vagina or rectum, and (c) distant metastases.

Inflammatory infiltration may complicate a uterine carcinoma. Nodular infiltration means carcinoma especially if the uterine tissue is continuous with the parametrial masses and the uterus is not displaced laterally, anteriorly, posteriorly, or superiorly. Fixation of the uterus occurs late in carcinoma and early in parametritis. It abates in the latter when resolution takes place. Coexisting tumors as ovarian cysts and uterine myomas may cause displacement of the uterus and impede its mobility though the carcinoma may be in the initial stage.

THE SYMPTOMATOLOGY

The sequence of symptoms in carcinoma depends on the extent of the growth. The clearly localized nodular growth is free from symptoms; the doubtfully localized, beginning ulcer and papilloma cause "contact bleeding"; the invasive, necrotizing carcinoma is accompanied by hemorrhage and discharge; and the crater-shaped, fixed carcinoma produces hemorrhage, discharge, and pain. It may be stated that hemorrhage is the earliest and most alarming symptom, discharge the most repulsive and constant symptom, and pain the most unfavorable symptom of cancer. A carcinoma causing pain is as a rule hopeless and incurable.

To the characteristic primary symptoms should be added the secondary or accessory symptoms resulting (1) from invasion of adjacent organs; (2) from compression of neighboring structures; (3) from toxemia due to the septicity of the cancer; and (4) from the cachexia occurring in all chronic and wasting diseases. Thus invasion of the bladder causes dysuria, pollakiuria, hematuria, and pyuria. Invasion of the rectum produces tenesmus, discharge, bleeding, and ribbon-like stools. Compression of the ureter terminates in hydronephrosis, eventually pyonephrosis with deep, constant, unbearable pain in the side affected. Septic infection is accompanied by pyrexia, putrid discharge, malaise, etc., while cachexia is characterized by an extensive katabolism, with rapid loss of weight and strength. Accessory symptoms are always suggestive of an advanced state of cancer and signify an absolutely poor prognosis.

THE CORRELATION OF THE HISTOLOGIC AND CLINICAL SIGNS

The various characteristics have been graded or grouped in numbers of four. If they are arranged accordingly, then Table I is obtained.

The conclusions may be drawn from Table I that the beginning nodule, the initial focus of carcinoma from which the disease progressively and inevitably develops, shows on microscopic examination a cellular atypia

TABLE I. CORRELATION OF THE HISTOLOGIC AND CLINICAL SIGNS

GROUP	MACROSCOPIC APPEARANCE	HISTOLOGIC DEVELOPMENT	THE GROUPING OF THE EXTENT OF THE GROWTH	THE SYMPTOMS
1.	Nodule	Cellular atypia	Clearly localized growth. Normal mobility of uterus.	None
2.	Ulcer or papilloma	Invasion of basement membrane	Doubtfully localized. Impeded mobility of uterus.	Contact Bleeding
3.	Large ulcer or cauliflower growth with necrosis	Destructive tendencies	Invasion of parametria or regional lymph nodes. The entire tumor mass is mobile.	Hemorrhage Discharge
4.	Crater	Metastasis, local or distant	1. Frozen pelvis with absolute *fixation* of tumor. 2. Local *dissemination* to vagina, bladder, or rectum. 3. Distant metastases.	Hemorrhage Discharge Pain

TABLE II. FIVE-YEAR END-RESULTS IN PRIMARY CARCINOMA OF THE CERVIX

CLINICAL GROUP	1	2	3	4	TOTAL
a. *All Cases up to 1927*					
Number	35	62	220	169	486
Total Number Five-Year Good End-Results	28	26	36	3	93
Percentage Five-Year Good End-Results	80.0	41.94	16.36	1.72	19.14
b. *Cases from 1924 to 1927*					
Number	12	14	61	69	156
Total Number Five-Year Good End-Results	10	6	18	3	35
Percentage Five-Year Good End-Results	83.33	42.85	26.23	4.35	22.43

of the epithelium, as yet devoid of invasion, destruction and metastation. The nodule is clearly limited and the uterus retains normal mobility. The growth has not thus far caused symptoms. These findings characterize the earliest stage of carcinoma. The diagnosis must be made by biopsy.

Perusing the following statistics it is seen that treatment in this stage shows a relative curability of 80 per cent. Treatment of cervical cancers during this stage, therefore, would place us in the control of cancer.

The observations that cancer does not start in healthy tissues or organs, and begins in a spot or focus the cells of which at first are not malignant; and that chronic irritation or inflammation causes this spot or works on this spot to produce the changes characteristic of malignancy, points to chronic cervicitis as a precursor of malignancy. The radical treatment of chronic cervicitis constitutes the best weapon against cancer, it is the prophylaxis of cancer.

According to Bailey, Schiller, Culbertson and others the first stage of carcinoma proceeds from a chronic cervicitis, which presents either

papillary erosions or follicular nodules. It results from an inflammatory subepithelial exudate which, not adequately fulminant to destroy the epithelial surface layer, causes the cells to proliferate forming erosions.

Bossi in 1913 discussed the true prophylaxis of uterine carcinomas and stated that chronic ulcers of the cervix and hyperplasia of the endometrium are precursors of carcinoma. He removed the diseased portion of the cervix by a low circular amputation and the hyperplastic endometrium by thorough curettage. Bossi did not observe a single cancer develop after many years of follow-up in about 7000 cases. Pemberton and Smith subjected all cervical tissue removed by operation to a systematic microscopic examination and found that 2.39 per cent of the cervix cancers were found by such examinations. During a period of fifty-two years, 5962 chronic cervicitides were treated, namely, 3814 with trachelorrhaphy, 740 cases with amputation, and 1406 with the electrocautery. Only 5 women developed cancer afterwards and in those cervices treated with trachelorrhaphy. They found in 669 carcinomas only 12 cases which had had a cervical plastic operation. Hunner subjected 2895 cases of chronic cervicitis to either amputation or cauterization and after a follow-up for ten years not a single case of cancer developed.

These statistics prove the superiority of amputation and cauterization over trachelorrhaphy in the prevention of cancer. The latter reshapes the cervix but does not remove all abnormal cell changes which are located in the transition zone between the cervical canal mucous membrane and the vaginal mucosa.

Hinselmann in a discussion of the use of the colposcope in diagnosis of cervical lesions, records the following observations: (1) Normally the vaginal mucosa should end sharply and ringlike at the external os. It is seen in about 20 per cent of such examinations. Cancer is never seen in such cervices. (2) An ectropic cylindrical cell mucosa does not predispose to carcinoma if the normal relations between vaginal and canal mucosae are maintained, though they are misshaped. Ectropion is usually due to a laceration without subsequent infection. They are observed in about 10 per cent of such examinations. (3) If a cervical erosion becomes chronic or heals, then a transition zone between the vaginal and canal mucous membranes forms, in which nodules or erosions may be seen. Such changes may become or are atypic and hence precursors of carcinoma. Such transition zones are present in about 70 per cent of such examinations.

Atypic changes in the transition zones are either composed of keratinized surface epithelial cells termed leucoplakias, or are desquamated areas devoid of pavement epithelium and may be recognized by Schiller's iodine test. Hinselmann saw about 2 per cent of leucoplakias or ulcerations which were considered atypical. Hence only two amputations would be indicated in 70 cases of chronic cervicitides. Whether these findings are correct the intensive studies with colposcopy will soon

demonstrate. At any rate unnecessary polypragmaty would thereby be obviated.

Schiller found in serial microscopic examinations of cervices of 135 uteri removed for various pathology, but not cancer, four beginning carcinomas, that is, 2.96 per cent. During the same time 35 cervix and 5 body carcinomas were clinically diagnosed in 1549 consecutive gynecologic cases, that is 2.55 per cent. One may conjecture therefore that 2.96 per cent of carcinomas can probably not be diagnosed clinically and the incidence of carcinoma in gynecologic cases in the clinic would be 5.51 per cent. It may be followed that the careful investigation of the cervix will probably put us in the control of the cancers.

The question arises how may one find the symptomless, clearly localized and nodular stage of carcinoma of the cervix? (1) The profession should educate women to report for periodic health surveys after each labor and abortion, and yearly thereafter. If symptoms of leucorrhea, menorrhagia, or irregular bleeding should occur the patient should apply immediately for an examination. (2) The duty rests on the gynecologist, the teacher of gynecologic diagnosis, to provide facilities for instruction in diagnosis to the general practitioner in his clinic, so he may be taught to recognize a pathologic cervix. If the practitioner is well trained in diagnosis he may institute necessary procedures. If he cannot do so he should know that immediate expert consultation should be had. Delay for the purpose of observation is an error where carcinoma must be ruled out or in. If the beginning stage of cancer were not devoid of symptoms then the outlook for better end-results of treatment would be encouraging.

Time does not permit to discuss the discovery of early carcinoma of the cervical canal mucosa and the corpus. Sounding and diagnostic curettage are indispensable in these locations.

I am confident that the attack of the cancer problem made according to the views expressed would assure the control of cancer. The iteration of these truths may be elementary and not necessary in a meeting of specialists. However, the detection of the early stage of cancer is a difficult problem and the gynecologist must bear a great share of this responsibility.

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FIVE-YEAR END-RESULTS IN THE TREATMENT OF CANCER OF THE UTERINE CERVIX AT THE BARNES HOSPITAL*

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IN THE Gynecological Service of Barnes Hospital from July 1, 1921, to April 1, 1926, 138 cases of carcinoma of the uterus were treated by H. S. Crossen and myself. Of this number, 121 were of the cervix (108 squamous cell carcinoma and 13 adenocarcinoma) and 17 were of the body of the uterus. This series of 121 cases of cervical carcinomas form the basis of this statistical study. Of the 121 cases, 15 could not be located in the follow up. These lost patients were counted as dead from cancer. The 17 cases of carcinoma of the uterine body will be discussed in a succeeding paper. There were a few patients admitted to the service and treated by other gynecologists. Also, a few patients practically moribund, were admitted to the service but not treated. These cases were not included in this series.

In the preparation of this study the hospital record of each case was very carefully reviewed by me and an abstract of the case was made on a work sheet. This sheet contained all the data of importance pertaining to the case and from these work sheets facts were tabulated. When the patient was discharged from the hospital, if she was a private patient, she was advised to report to her respective physician for further observation and treatment. If she was a house case, she was advised to return to the gynecologic out-patient department for further care.

In the out-patient department, we maintain a gynecologic cancer clinic, in which there is a diagrammatic chart, giving the patient's name and date to return to the clinic. The patients are given an appointment card with the date marked on it when they are to return. They are instructed to return to the clinic every six weeks for the first year after receiving the initial treatment; every three months the second and third years; and every six months the fourth and fifth years. After five years has elapsed since the first treatment they are instructed to return to the clinic once a year. On each return to the clinic we examine the patients very carefully to determine whether or not more treatment is indicated. The treatment usually given after leaving the hospital consists of deep x-ray therapy to the pelvis and lower abdomen. The x-ray machine used is one of 200,000 volts. Rarely is radium repeated, though in a few cases, we feel radium repeated is more effectual than the deep x-ray therapy.

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The clinic cases are under the direction of the social service workers who see that they return at the appointed time. The follow-up in some instances has been difficult. Some patients move and leave no forwarding address and the social worker makes innumerable visits trying to locate them. Letters are sent to the patients and their physicians and neighbors and to postmasters and Red Cross workers in various towns and finally the bureau of vital statistics of the state in which they resided is consulted to see if they are listed as dead.

In this series of 121 cases, only 15 were lost in the follow-up, which is considered a fair record. Miss Ekka Gordon, social service worker, of the gynecologic service deserves much credit for her aid in locating the cases and when found living, getting them back to the clinic for examination. All of the living patients in this series have recently been examined by one of us and the accuracy of the pelvic findings vouched for. We believe that a follow-up that is conducted by the gynecologist himself is of far greater accuracy and therefore of more value in drawing conclusions, than is the follow-up by letter from the department to the patient or family physician.

We have found that the fact that the patient realizes she will be seen and examined by the person who operated upon her and who therefore, from her viewpoint, has a personal interest in her case will insure a high percentage of returns. In order to get the best cooperation of the patient, in most instances the patient is told she has cancer and the seriousness of the malady is explained to her. Of course, there are a few patients whose mental state is such it is best not to tell them, but rather explain the condition to some relative so they will see that she returns at the appointed time. We have realized for some time, that the greatest success is achieved by absolute cooperation from the patient. If they know they have cancer, regardless of the fact they have no suspicious symptoms after they have received treatment, they will return regularly for pelvic examination.

In figuring percentages of results, we consider that more accurate deductions can be made with greater simplicity if the patients are classified as living after five years. We think also, that percentages should be based on cases treated and consider as dead all those patients of whom we have lost track.

In studying this series of cases, there is a microscopic report of every case. The pathologic grouping by cell types was carried out by R. J. Crossen, who reviewed all slides.

Most gynecologists are now agreed that once a definite diagnosis of uterine cervical cancer has been made, the case is one for radiation or surgery. The patient should first be examined, not only to determine the extent of the local disease, but to ascertain the general condition of the patient. It is especially necessary to ascertain if any metastatic malignancy is present which will have a great influence on the treatment. Be-

fore considering the method of treatment in a particular patient, it is well that the growth present be classified in order to provide a convenient means for discussing the therapy. A classification we have found simple and reliable is as follows:

Class 1. Cases in which only the cervix is involved.

Class 2. Cases in which the cervix is involved with slight parametrial involvement, but there is no fixation to the pelvic wall.

Class 3. Cases in which the cervix is involved and there is parametrial involvement to the pelvic wall.

Class 4. Cases in which there is extensive involvement of the upper vaginal vault including the bladder and rectum.

In Class 1 there were 2 cases, both cured. Of course this is of no special statistical significance. Our clinical classification was so conservative that we found only two patients out of 121 in whom we felt operation to be justified. Both patients are living and well at this time.

One developed a ureterovaginal fistula eight days after operation. Six months later the right ureter was transplanted into the bladder. Follow-up on January 1, 1931, revealed no function of the ureter and kidney on the right side. The other patient had a large myoma of the uterus with a diseased cervix which was not diagnosed as cancer until after the uterus had been removed by a complete hysterectomy.

In Class 2 there was only one case.

The case was thought to be one of chronic cervicitis with laceration. A biopsy of the cervix was taken and squamous carcinoma was found. The parametrium on the left side of the uterus was infiltrated almost to the pelvic wall; 3800 mg. hr. of

TABLE I. CLASS 3. CASES IN WHICH THE CERVIX WAS INVOLVED AND THERE WAS PARAMETRIAL INVOLVEMENT TO THE PELVIC WALL. TREATMENT, RADIUM AND X-RAY. NUMBER OF CASES 108

Number of cases	108										
Lost	12										
Age	20-29.	30-39.	40-49.	50-59.	60-69.	70-79.					
	6	23	26	26	8	7					
Color	77—white	19—colored									
Para	11—nullipara	10—primipara	75—multipara								
History cancer in family	8—yes	88—none									
Duration bleeding before treatment	None	1-6 mo.	6-12 mo.	1-2 yr.							
	1	55	27	13							
Duration pain before treatment	None	1-6 mo.	6-12 mo.	1-2 yr.							
	18	58	18	2							
Type of cell	Sq. I.	Sq. II.	Sq. III.	indeterm.	adenocarcinoma						
	19	39	8	19	11						
Wassermann	11—positive	48—negative	37—none								
Mg. hr. radium	1600	1800	2000	2400	3000	3600	4000	4500	5000		
	2	3	9	4	33	5	19	4	17		
Number x-ray treatments. Series	1	2	3	4	5	6	7	8	9	none	
	30	17	22	9	5	4	1	1	2	5	
Died from cancer								70			
Died within one year								28			
Died between one and three years								34			
Died after three to five years								8			
Died from other causes								2			
Alive and well after five years								24			
Cured from radium and x-ray therapy after five years								22.2%			

TABLE II. CLASS 4. CASES IN WHICH THERE WAS EXTENSIVE INVOLVEMENT OF THE UPPER VAGINAL VAULT INCLUDING THE BLADDER AND RECTUM. TREATMENT, X-RAY. NUMBER OF CASES 10

Number of cases	10				
Lost	3				
Age	20-29.	30-39.	40-49.	50-59.	60-69.
	1	2	3		1
Color	6—white	1—colored			
Para	1—nullipara	3—primipara	3—multipara		
History cancer in family	7—none				
Duration bleeding before treatment			1-6 mo.	6-12 mo.	1-2 yr.
			3	3	1
Duration pain before treatment			1-6 mo.	6-12 mo.	1-2 yr.
			3	4	
Type of cell	Sq. I.	Sq. II.	Sq. III.	indeterm.	adenocarcinoma
	1	2		3	1
Wassermann	6—negative	1—none			
Mg. hr. radium	None				
Number x-ray treatments	Series	1	2	4	
		3	3	1	

Died from cancer	7
Died within one year	6
Died between one and three years	1
Died after three to five years	0
Died from other causes	0
Alive and well after five years	0
Cured from deep x-ray therapy	0

TABLE III. SCHEDULE I. ANALYSIS OF CERVICAL CARCINOMA CASES CURED AFTER FIVE YEARS. NUMBER OF CASES 27

CASE NO.	NAME	COLOR	AGE	NUMBER PREGNANCIES	DURATION BLEEDING BEFORE TREATMENT	DURATION PAIN BEFORE TREATMENT
1	Mrs. M.	B	46	I	6-12 mo.	1- 6 mo.
2	Mrs. M.	W	39	None	6-12 mo.	6-12 mo.
3	Mrs. T.	W	63	VII	6-12 mo.	1- 6 mo.
4	Mrs. B.	W	43	II	1- 6 mo.	1- 6 mo.
5	Mrs. V.	W	36	VI	6-12 mo.	1- 6 mo.
6	Mrs. A.	W	55	VII	1- 6 mo.	None
7	Mrs. W.	W	38	V	6-12 mo.	1- 6 mo.
8	Mrs. A.	B	47	II	None	None
9	Mrs. M.	W	59	III	1- 6 mo.	None
10	Mrs. A.	W	45	V	1- 6 mo.	None
11	Mrs. G.	W	50	III	1- 6 mo.	None
12	Miss M.	W	43	None	1- 6 mo.	1- 6 mo.
13	Mrs. R.	W	28	II	6-12 mo.	1- 6 mo.
14	Mrs. P.	W	44	III	1- 6 mo.	None
15	Mrs. K.	W	45	IX	1- 6 mo.	None
16	Mrs. N.	W	43	I	6-12 mo.	1- 6 mo.
17	Mrs. H.	W	53	None	6-12 mo.	1- 6 mo.
18	Mrs. T.	B	36	V	6-12 mo.	1- 6 mo.
19	Mrs. G.	W	54	IV	6-12 mo.	1- 6 mo.
20	Mrs. M.	W	59	X	1- 6 mo.	None
21	Mrs. L.	W	54	None	1- 6 mo.	None
22	Mrs. P.	W	33	VI	6-12 mo.	1- 6 mo.
23	Mrs. H.	W	38	V	6-12 mo.	1- 6 mo.
24	Mrs. K.	W	47	V	1- 6 mo.	None
25	Mrs. G.	W	66	XII	6-12 mo.	1- 6 mo.
26	Mrs. G.	B	37	I	1- 6 mo.	1- 6 mo.
27	Mrs. T.	B	47	I	6-12 mo.	1- 6 mo.

radium were given and a few days later a radical abdominal hysterectomy was performed. Fourteen days after the operation a series of deep x-ray therapy was given. Three months later another series of deep x-ray therapy was given. At the present time the patient is living and well.

In the past five years we have not been so conservative in our classification and our operative mortality is much the same as many other investigators have reported.

In Class 3, there were 108 cases (Table I). By far the greatest number of cases treated came in this class. The treatment was radium and x-ray therapy and 24 patients lived five years and longer after receiving irradiation, 22.2 per cent cures.

In Class 4, there were 10 cases (Table II). They received deep x-ray therapy alone and not a single patient lived five years after treatment. The majority of the patients died within one year after treatment.

Tables III and IV, Schedules 1 and 2, show an analysis of the cervical

TABLE IV. SCHEDULE II. ANALYSIS OF CERVICAL CARCINOMA CASES CURED AFTER FIVE YEARS. NUMBER OF CASES 27

CASE NO.	NAME	CLASS	TYPE CELL	OPERATION AND DATE	MG. HR. RADIUM DATE GIVEN	SERIES X-RAY AFTER RADIUM	DATE LIVING
1	Mrs. M.	3	III	....	2250 7-16-21 2250 9-16-21	4	4-10-1927
2	Mrs. M.	1	Indet	Rad. Abd. Hysterec. 7-14-21	None	None	2-10-1931
3	Mrs. T.	3	II	....	5000 3-10-22	2	2-10-1931
4	Mrs. B.	3	Indet	....	4000 3-27-22	2	2-10-1931
5	Mrs. V.	3	III	....	3000 4-24-22	2	2-10-1931
6	Mrs. A.	3	I	....	5000 5- 6-22	2	2-10-1931
7	Mrs. W.	3	I	....	5000 5- 6-22	None	2-10-1931
8	Mrs. A.	1	Ad-C	Rad. Abd. Hysterec. 6-22-22	None	None	2-10-1931
9	Mrs. M.	3	II	....	5000 7- 8-22	1	10-7-1927
10	Mrs. A.	3	Indet	....	5000 9-14-22	2	2-10-1931
11	Mrs. G.	3	II	....	5000 9-19-22	2	2-10-1931
12	Miss M.	3	II	....	2000 11-2-22	1	2-10-1931
13	Mrs. R.	3	II	....	3000 2-21-23	1	2-10-1931
14	Mrs. P.	2	II	Rad. Abd. Hysterec. 6-8-23	1800 5- 5-23 2000 6- 3-23	2	2-10-1931
15	Mrs. K.	3	Indet	....	3800 6-11-23	3	2-10-1931
16	Mrs. N.	3	Indet	....	3000 8-23-23	1	1- 1-1929
17	Mrs. H.	3	Ad-C	....	3000 7- 8-24	4	2-10-1931
18	Mrs. T.	3	II	....	3000 8-11-24	3	2-10-1931
19	Mrs. G.	3	II	....	2000 10-2-24	3	6- 4-1930
20	Mrs. M.	3	III	....	3000 11-19-24	None	2-10-1931
21	Mrs. L.	3	I	....	1600 2- 4-25	4	2-10-1931
22	Mrs. P.	3	Indet	....	3000 9- 1-25	6	2-10-1931
23	Mrs. H.	3	I	....	4000 9- 8-25	1	2-10-1931
24	Mrs. K.	3	III	....	4000 10-21-25	1	2-10-1931
25	Mrs. G.	3	III	....	3600 11-27-25	4	2-10-1931
26	Mrs. G.	3	II	....	4000 1-31-26	2	2-10-1931
27	Mrs. T.	3	I	....	2000 3-26-25	4	3- 1-1931

carcinoma cases cured after five years. Total number of cases 27, cured per cent 22.3.

4 cases had never been pregnant.
23 cases had one or more pregnancies.
1 case had never been married.
1 case gave no history of bleeding before treatment.
12 cases gave history of bleeding one to six months before treatment.
14 cases gave history of bleeding six to twelve months before treatment.
10 cases gave no history of pain before treatment.
16 cases gave history of pain one to six months before treatment.
1 case gave no history of pain six to twelve months before treatment.

Two cases were adenocarcinoma and 25 were squamous cell in type. Of the 25 squamous cell carcinomas, 6 were in Group I cell type, 8 were in Group II, 5 were in Group III and 6 were indeterminate because of the marked necrosis of the specimens received in the laboratory.

Concerning the dose of radium. Two patients received 1600 mg. hr. and 1 patient is living. Nine patients received 2000 mg. hr. and 3 patients are living. Thirty-three received 3000 mg. hr. and 7 patients are living. Five patients received 3600 mg. hr. and 2 patients are living. Nineteen patients received 4000 mg. hr. and 4 patients are living. Seventeen patients received 5000 mg. hr. and 7 patients are living.

TECHNIC

The technic of application that we employ is as follows: The radium bromide salt is used. It is sealed in a glass capsule, this capsule is then placed in a silver capsule 1 mm. thick; the silver capsule is then placed in a brass capsule 1 mm. thick which is then placed in rubber tubing. In this form it is inserted into the uterine and cervical canals. If there is any chance of the radium getting out of position after its application, it is well to suture the cervix to hold it firmly in place. The dosage of 100 mg. is used (25 mg. in uterine cavity, 75 mg. in cervical canal) for twenty to fifty hours depending upon the amount of involvement of the cancer and the amount of tissue present for screening. Gauze is used to pack the bladder and rectum well away from the radium. In many cases a small rubber tube drain is inserted into the uterine cavity along side the radium to take care of any pyometra that may be present. A retention catheter is placed in the bladder in all cases. The silver, brass and rubber tubing screening of the radium is to filter out the harmful rays, and distance screening with vaginal gauze is for the protection of the bladder and rectum. With this technic, bladder and rectal fistulas are rarely seen.

SIGNIFICANCE OF THE RESULTS

There is a vast difference of opinion as to the indication for radium or operation. Many investigators feel radium should be used in all cases, others adhere to the classification similar to the one we have outlined. We feel each case should be classified before deciding on the treatment. We know that cancer is radium sensitive and radium resistant, the latter very rare, but does actually occur. So when early carcinoma is found we feel radical hysterectomy should be performed, unless the patient is a bad operative risk. Out of 121 cases only two cases were placed in Class 1

and 1 case in Class 2. The three patients were operated upon and today are living and well. In Class 3 we placed 108 cases. They received radium and x-ray therapy. The dosage of radium varying from 1600 mg. hr. to 5000 mg. hr. of this class, 24 (22.2 per cent) are living after five years. In Class 4 we placed 10 cases and they received deep x-ray therapy alone. None are living after five years.

In studying the statistics of large series of cases reported from several clinics both in America and Europe, one is struck by the fact that clinics where operation is the choice of treatment, show 20 to 30 per cent five-year cures. Also, clinics where irradiation is used entirely show similar percentage of cures. Radical hysterectomy, vaginal or abdominal, has been employed much longer than radium which has been used extensively the past fifteen years, and the fact that a comparison of the percentage of the cures is practically the same, makes us realize that with radium we have not made the progress in the treatment of uterine cancer we had hoped for. Apparently if we are going to reach that much heralded 50 per cent or more of cures by either operation or irradiation we must recognize cancer much earlier than we have in the past.

It seems obvious that the work of educating patients to seek a diagnosis at the very onset of suspicious symptoms is of importance, for it is clearly evident that the greatest percentage of cures is seen in the early cases. Also it is important that the family physician be alert and always on the lookout for symptoms suggestive of cancer and wherever possible make a vaginal examination.

In our gynecologic clinic it is interesting to note the number of early cancers of the uterus discovered in the past few years. All of the men working in the clinic are "cancer minded" and I am sure our next five year report will show more gratifying results than the present one.

SUMMARY AND CONCLUSIONS

1. Twenty-seven out of 121 patients lived five years or more after treatment, 22.3 per cent five-year cures.

2. The first symptom in the great majority of cases was vaginal bleeding.

3. The majority of the cases had bleeding or pain for six months before applying for treatment.

4. The greatest percentage of cures from radium was in older people, the younger the person the greater the mortality.

5. The greatest number of patients applying for treatment were in clinical Class 3. Twenty-four patients lived five years or more after treatment, 22.2 per cent cures.

6. Radium was effective in relieving hemorrhage and discharge in most of the cases.

411 WALL BUILDING.

THE MODIFIED ASCHHEIM-ZONDEK TEST*

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THE principles involved in the Aschheim-Zondek test for pregnancy have been presented so frequently and adequately that reiteration is unnecessary. The original method has received recognition as a diagnostic procedure of unusual accuracy, but, due to its technical difficulties, has unfortunately been denied the wide spread application which it merits. That the observations of Friedman,[1, 2] who was the first to call attention to the prompt ovulatory reaction in the rabbit following the injection of the urine of pregnancy, suggested a method of decreasing the technical difficulties of the test is evidenced by the numerous and diverse methods which have since been submitted.

The various phases of the substitution of rabbits for mice have been presented in considerable detail in the publications of Friedman and Lapham,[3] Reinhart and Scott,[4] Wilson and Corner,[5] Schneider,[6, 7, 8] and in the work of a large number of others whose results have as yet not been published. In spite of the fact that each of the above group of workers has obtained its results in a somewhat different manner, the technic in each instance has yielded results which have been comparable in accuracy with those obtained by the original method. In addition, the use of rabbits has decreased the time necessary for the completion of the test and considerably minimized the technical difficulties of the procedure.

A brief consideration of the essentials of the methods submitted will demonstrate more clearly their points of difference. Friedman and Lapham[3] advocate the use of adult female rabbits which have been isolated individually for a period of three weeks before being used. Five cubic centimeters of urine is injected three times daily for a period of two days time and autopsy is performed at the end of forty-eight hours. Friedman has demonstrated that frequent small injections of urine cause a greater stimulation to ovulation in the rabbit than a single large injection of equal amount.

Reinhart and Scott[4] use immature rabbits three months of age, weighing at least 3½ pounds each, and use a single injection of 5 c.c. of urine, followed by laparotomy at the end of twenty-four hours. If at this time a definite positive result is not obtained, the abdominal wound is closed, the rabbit reinjected, and operation repeated twenty-four hours later.

Wilson and Corner[5] advocate the use of adult female rabbits weighing 4 pounds or over, which have been kept in strict isolation for one month or more. The injection of 5 c.c. of urine is followed by laparotomy in not less than sixteen hours, at which time the positive diagnosis is dependent on the presence of freshly ruptured graafian follicles, laparotomy making possible repeated use of the same rabbit as early as two days thereafter.

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The technic suggested by me consists essentially of the use of immature rabbits four to four and a half months of age, with a single injection of 12 to 15 c.c. of urine, followed by autopsy forty-eight hours later.

Other proponents of the use of mature rabbits have suggested examination of the ovaries by laparotomy prior to the injection of the urine as an added safety measure in the elimination of false positives. This pro-

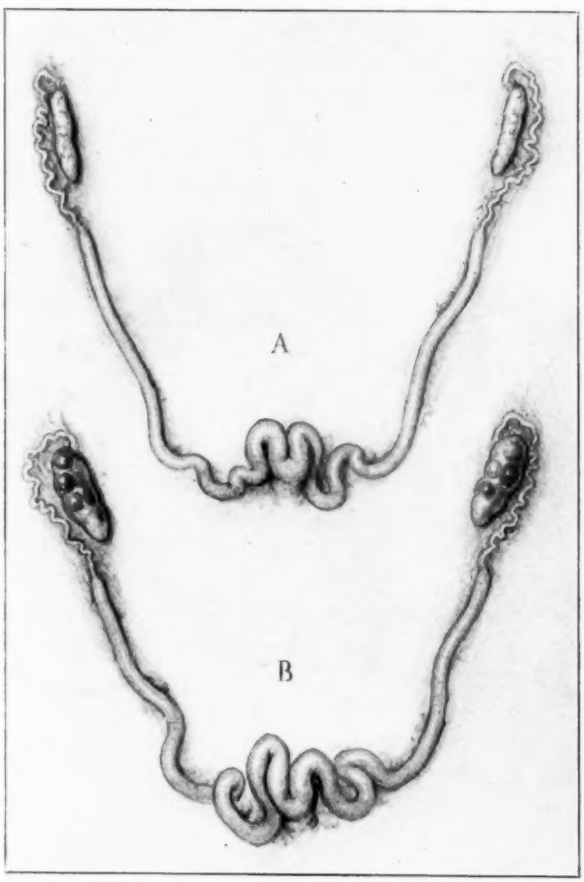

Fig. 1.—*A*, Corpora hemorrhagica and corpora lutea in the ovaries of an immature rabbit, resulting from the injection of the urine of pregnancy and demonstrating a positive result.

B, The normal ovaries of an immature rabbit, showing the cylindrical appearance of the ovary and the presence of visible follicles. This constitutes a negative result.

cedure has the advantage of necessitating individual isolation for a period of only eighteen hours.

DETAILS OF THE PRESENT SERIES

The present series of 500 cases in the application of the principles of the Aschheim-Zondek test for pregnancy by the use of rabbits, had its inception in the work of Friedman[1, 2] and was begun in January, 1930, the

first series of 100 cases being presented June 17, 1930.[6] Subsequently the test has been applied clinically in an additional 400 cases.

TECHNIC

The urine to be examined is obtained as a voided first morning specimen and, if possible, the patient is instructed to restrict fluids in an effort to obtain a sufficiently concentrated specimen. Routine filtration of each specimen prior to injection has completely eliminated the immediate mortality to the rabbit which has been encountered when cloudy nonfiltered specimens were injected.

The animals used for the test are obtained from a single reliable source of supply, are all of the same breed, and are known to be of an average age of four to four and a half months. The use of immature rabbits obviates the necessity of individual isolation, thus making it possible to maintain an adequate supply in rather limited space.

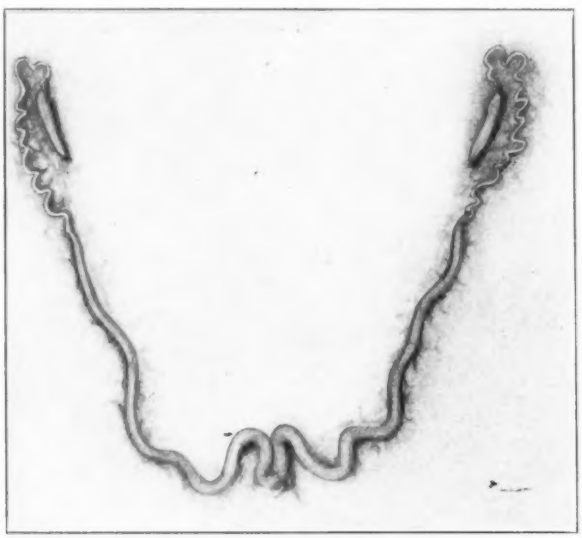

Fig. 2.—The ovaries of a rabbit not sufficiently mature to be satisfactory for the test and recognized by the opaque appearance, absence of visible follicles and flat or stellate conformation. Such an ovary at autopsy indicates an improper test animal.

Forty-eight hours following injection of 12 to 15 c.c. of the filtered urine into the marginal ear vein of the rabbit, autopsy is carried out and the ovaries inspected. The presence of definite corpora hemorrhagica or corpora lutea, or both, regardless of the number or whether present in only one or both ovaries, is accepted as a positive diagnosis of living decidual tissue in contact with the maternal organism. (Fig. 1 *A*.) It is not necessary to determine whether rupture of the follicles has occurred when immature rabbits are used. In the absence of the above findings, further inspection of the ovaries should reveal a somewhat cylindrical ovary, showing the presence of many small unripe follicles visible in the substance of the ovary. (Fig. 1 *B*.) These findings constitute a negative result.

If, however, the ovary is small and flat or stellate, with a smooth opaque appearance, and there is an absence of visible follicles, it may be assumed that the ovaries of the particular rabbit used have not developed to sufficient maturity to respond to the stimulus of the hormone content of the urine. (Fig. 2.) Repetition of the test should be carried out before a diagnosis is rendered. The recognition of im-

mature ovaries in this manner has been found to be very essential, especially when it is impossible to obtain a reliable source of supply of rabbits, and the exact age of the test animals cannot be determined. It is also true that various breeds of rabbits mature later than others, while even a number of the same litter may show appreciable variations and abnormalities. Any one of the above factors may have been responsible for negative errors which have been obtained in some instances by other workers attempting the application of the test by using immature rabbits.

Autopsy, rather than laparotomy, has been selected as the method of choice in the present series of cases, due not only to the lack of facilities, but also to the fact that the lowered cost of immature rabbits does not seem to justify the expenditure of the time necessary to preserve the life of the rabbit.

RESULTS

In an analysis of the 500 cases in which the above technic has been used, no conditions other than pregnancy or certain of its sequelae have yielded positive results. This may be of significance upon consideration of the fact that previous workers with the original Aschheim-Zondek test have in some instances reported positives resulting from conditions which are known to cause hypertrophy of the pituitary body, particularly the amenorrheas, both primary and secondary, and certain endocrinopathies. The above findings indicate that false positives may be considered as a negligible factor when immature rabbits are used.

False negatives have been obtained in only two conditions. The first of these occurred when rabbits were used which were not of the proper age or development. The second was due entirely to the limitations of the test.

In two cases a positive reaction has been obtained approximately three weeks following the intercourse responsible for the pregnancy. In three instances positive results have been obtained prior to a missed menstrual period, the preceding menses in each instance showing no variation from the normal.

On the other hand, negative reactions have been obtained from four to five days following a missed menstrual period in which repetition of the test four or five days later was followed by positive reaction. These findings demonstrate clearly the necessity for an accurate menstrual history in each case, so that a diagnosis will not be rendered until corroborated by a repetition of the test at a sufficiently late date.

The value and limitations of the test in abortion, missed abortion, hydatidiform mole, and chorionepithelioma have been presented in previous communications and by other workers, and further emphasize the necessity for careful consideration of clinical history and physical findings in the interpretation of results.

DISCUSSION

The uniformly excellent results and comparative simplicity of technic provided by each of the four modifications suggested, emphasize the extent to which the substitution of rabbits has facilitated the Aschheim-

Zondek reaction and increased its availability as a diagnostic procedure, which does not necessitate a fully equipped laboratory and a high degree of technical skill.

This does not mean that the test is fool proof, and regardless of which method is used, absolute adherence to the details of the technic is a vital factor in its successful application.

Consideration of the various methods indicates that the selection of a method of choice will undoubtedly be influenced by the facilities which are available. If used in a well equipped laboratory, it is possible to keep large numbers of rabbits individually isolated and devote the time necessary to laparotomize the animals in each instance. Where these advantages are not available, it should be possible to establish a reliable source of supply of immature rabbits of a known age and permit autopsy to function as a time saving element.

CONCLUSIONS

1. The various methods utilizing the rabbit as a diagnostic procedure, when properly executed, yield uniformly accurate results.

2. When immature rabbits are used, the possibility of positive errors is rendered practically negligible.

3. The recognition of immature ovaries at autopsy, in addition to careful consideration of the physical findings and history, makes it possible to reduce the negative errors to a minimum.

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Itzkin, S.: The Tolerance of a Pregnant Uterus Duplex Toward Repeated Curettage of the Non-Gravid Half. Monatschr. f. Geburtsh. u. Gynäk. **84**: 249, 1930.

The author searched the literature for cases of double uteri where a pregnancy remained undisturbed in one horn in spite of a curettage of the other nonpregnant horn. He found only four authentic cases and reports an additional one. In his case, the pregnancy was not interrupted though repeated curettements of the nongravid half of the uterus had been done. To further emphasize the tolerance of double uteri the author discusses the cases where the decidua of the nonpregnant side was expelled long before the baby was born from the other half of the uterus and also those cases where pregnancies existed in both horns and the fetuses were expelled separately with a long interval of time between.

J. P. Greenhill.

OBSERVATIONS ON SECONDARY ANEMIA DURING PREGNANCY*

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(From The Mayo Foundation)

ANEMIA is relatively common during pregnancy, especially in the later months. Lyons stated that among one-third of 200 patients examined in the third trimester, the concentration of hemoglobin was 70 per cent or less. Bland found that among 50 per cent of 200 patients, erythrocytes numbered 3,500,000 in each cubic millimeter of blood. A large majority of the cases of anemia of pregnancy are of a mild, secondary type.

Severe anemia complicating pregnancy is relatively uncommon. In reporting two cases of severe anemia of pregnancy, Evans stated that he did not see a case of severe anemia among women who represented 4,083 labors in the years 1926 and 1927. Pohl stated that geographic locality sometimes plays a part in severe cases of anemia, and he quoted Wolff, who reported 22 cases among 14,400 births in Zürich, only 8 cases among 90,000 births in Vienna in thirty years, and 27 cases in Parma in three years.

As Pepper pointed out, much of the literature on the subject of anemia of pregnancy antedates modern hematology, thus leading to much confusion between the so-called pernicious anemia of pregnancy and true primary pernicious anemia. Among recent writers, Brault, Devraigne and Laennec, and Audebert and Fabre used the term "pernicious anemia of pregnancy"; others, including Evans, Murdock, Rowland, Bland, Esch, Pohl and Alder have preferred the term "pernicious-like anemia of pregnancy." Pepper stated that in none of forty undoubted cases of pernicious anemia among women, at the University Hospital of the University of Pennsylvania, was there any relationship between pregnancy and the occurrence of the anemia.

Mention may be made, briefly, of other types of anemia which may rarely complicate pregnancy; hemolytic icterus, leucemia, purpura hemorrhagica, aplastic anemia, and hemophilia. Also, more or less severe grades of secondary anemia may be the result of loss of blood, frequent childbearing, and complicating conditions such as syphilis, pyelonephritis, toxemia, chronic nephritis, puerperal infection and tuberculosis. Husfeldt reported a severe case of anemia in pregnancy due to lead poisoning.

Alder postulated that preexisting chlorosis due to deficiency of bone marrow is responsible for severe grades of anemia and that the strain

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of pregnancy results in lowered capacity of the function of bone marrow. Others consider chlorosis merely a result of deficiency of hemoglobin. Hofbauer suggested that there is a syncytial hemolysin which if not counteracted by autolysin, results in destructive anemia. Larrabee in his excellent classification of various etiologic hypotheses also included the hypothesis that isoagglutinins of the fetus, when incompatible, may cause toxemia or hemolysis in the mother.

Since many pregnant women have some degree of anemia, it may be assumed that a toxic factor, the result of pregnancy, or failure of physiologic adjustment, is the cause of the anemia. Kühnel reviewed the subject and studied the morphology of the blood of fifteen normal healthy pregnant women and concluded that there is a true anemia of pregnancy. Others have stated that the hemoglobin content of the blood is normal or slightly increased in the later months of pregnancy.

From the hematologic standpoint practically all anemia of pregnancy belongs to either one of the two general types of secondary anemia.

Type I anemia in which bone marrow is apparently deficient in activity, is most commonly seen. It is characterized by a moderate reduction in erythrocytes with approximately an equal decrease in hemoglobin. Morphologically, the erythrocytes usually show slight hypochromasia (practically normal), moderate anisocytosis, and varying degrees of polychromatophilia, depending on the degree of anemia present.

In early pregnancy there seems to be suppression in activity of bone marrow, as evidenced by the proportion of reticulated erythrocytes in the blood. In the later months of pregnancy the bone marrow apparently becomes hyperactive. The reticulated erythrocytes increase, yet fail to bring the blood count back to normal. This continued anemia in the later months of pregnancy, in spite of increasing numbers of reticulated erythrocytes, is probably due to some hemolytic agent. That a toxic agent is present is evidenced by the neutrophilic leucocytes which present varying degrees of toxicity, as shown by moderate shift to left, swelling of the nucleus, cloudiness of the chromatin and irregularity in distribution of the specific granulation and intensification of the staining reaction of the individual granules.

Type II anemia differs from Type I in one respect only; the hemoglobin is much more reduced in proportion to the reduction of erythrocytes, resulting in a marked hypochromasia, that is, the deficiency type of hemoglobin from the morphologic standpoint. The other features are approximately the same as in the Type I. Evidence indicates that Type II anemia is usually present prior to pregnancy and grows worse during pregnancy. It frequently persists following delivery and usually requires treatment.

A morphologic study was made of the blood of 82 pregnant women in whom the concentration of hemoglobin was below 70 per cent by the Dare method. Further hemoglobin readings and study of the blood cells

were made in most instances during and after pregnancy. Some of the patients were treated with extract of bone marrow and some with powdered fetal liver during the course of pregnancy. Later certain patients with anemia during pregnancy were treated with ferric citrate or ferric ammonium citrate.

The anemia of 58 of the 82 patients was classified as Type I, of 16 as Type II; 7 patients manifested changes characteristic of both types, and the anemia of one patient could not be classified.

Evidence of toxicity was found in 41 of the 58 cases of Type I, in only 11 of which was it more than of mild degree. It was noted in 10 of the 16 cases of Type II, in 6 of which it was well marked; and it was noted in 4 of the 7 cases of Types I and II.

The toxic factor or factors causing changes in blood cells was not determined. However, a search for possible contributing causes showed that 4 patients had pyelonephritis, 2 had had mild influenza; 2 had infected tonsil tags, 7 had some evidence of periapical dental infection; one patient had infected tonsils with chronic mitral endocarditis (compensated), and one had acute infectious arthritis and infected tonsils. Of 9 cases, the anemia in 4 was classified as Type I, and in 5 as of Type II; hematologic evidence of toxicity was marked. In all but 2 of these cases evidence of probable etiologic factors was demonstrated. Three of the patients had pyelonephritis, one of whom had also healed lesions of pulmonary tuberculosis; one patient had chronic mitral endocarditis and infected tonsils, one had had severe hyperemesis in the first trimester, one had had splenectomy for purpura hemorrhagica two years previously, and one had residual evidence of acute infectious arthritis and infected tonsils. Following tonsillectomy during the pregnancy of this patient the hemoglobin rose from 57 to 84 per cent in the course of ten weeks.

An extract of bone marrow obtained from a pharmaceutical firm was given in doses of 2 gr. three times a day to most of the patients with anemia of Type I. Subsequent use of extract of bone marrow indicated that much larger doses could have been used. Powdered fetal liver in teaspoonful doses in grape juice three times a day was given to some of the patients with anemia of Type II. In some instances even this small dose caused nausea and had to be discontinued.

In 24 of the cases of anemia of Type I and in 5 of those of Type II, estimations of hemoglobin were made to determine whether increase in the hemoglobin content of the blood was affected by the use of the drugs. In only 7 of the cases of Type I and in two of those of Type II was there a definite elevation of the hemoglobin. Later ferric citrate or ferric ammonium citrate in 20 to 30 grain doses three times a day was used in 20 cases of similar anemia, and 16 patients showed definite improvement. In a control group of 35 cases with secondary anemia of pregnancy in which treatment was not given aside from diet, spontaneous improvement occurred in 9. In these untreated cases the average concentration

of hemoglobin was 65 per cent in the first trimester, 57 per cent in the second, and 56 per cent in the third. In the cases treated with bone marrow or fetal liver the concentration of hemoglobin was 61 per cent in the first trimester, 57 per cent in the second, and 55 per cent in the third. In those treated with ferric citrate or ferric ammonium citrate the concentration of hemoglobin was 61 per cent in the first trimester, 63 per cent in the second, and 66 per cent in the third.

COMMENT

This is a preliminary report of observations on secondary anemia during pregnancy. This is relatively common and there is a tendency for it to increase as pregnancy progresses.

Usually secondary anemia may be classified in two general types, the most common of which is Type I. In fact this type of secondary anemia seems to be true anemia of pregnancy, characterized by suppressed activity of bone marrow early in pregnancy and by evidence of hemolysis when the bone marrow becomes more active in the later months. There is a tendency for patients to recover spontaneously after delivery. It seems probable that severe cases of this type of secondary anemia make up a large part of the cases which have formerly been termed "pernicious" or "pernicious-like" anemia.

It seems probable that the Type II anemia is present prior to pregnancy, grows worse during pregnancy and persists after delivery. The use of organotherapy such as extracts of bone marrow and powdered fetal liver was not followed by appreciable improvement in this group of cases. However, this may have been due to insufficient dosage or inability of the patient to take the product. The use of ferric citrate or ferric ammonium citrate in large doses, 20 to 30 gr. three times a day, was followed by distinct elevation of hemoglobin in 75 per cent of a small group of cases.

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A STUDY OF THE DEATHS FOLLOWING 6022 GYNECOLOGIC OPERATIONS*

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IN THIS paper is presented a brief analysis of the deaths which occurred on the Gynecological Service of the Cook County Hospital from January 1, 1926 to January 1, 1931. Some difficulty was encountered in obtaining all the records, and there was still more hardship in attempting to find the actual cause of death in some of the cases. To do this, I utilized not only the internes' records but also the nurses' notes, the anesthetists' records, the reports of the pathologic tissue which was removed and the autopsy reports. In spite of this some of the combined records were incomplete and I had to surmise the cause of death in these cases. There were only 40 autopsies in this series of 213 deaths. However this incidence of 18.8 per cent for autopsies during the five-year period studied is not much below the frequency of postmortems at the Cook County Hospital for all the services. Thus during 1929 the total incidence of autopsies at this hospital was only 22.1 per cent, in 1928 it was 19.3 per cent, in 1927 it was 21.9 per cent, and in 1926 it was 21.8 per cent.

During the five-year period under consideration there were 6.022 operations of which 5,308 or 88.1 per cent were major and 714 or 11.9 per cent were minor in character. In this series there were 213 deaths, an incidence of 3.5 per cent. The distribution of the operations and the death rate according to each year is shown in Table I.

TABLE I

YEAR	NO. OF OPERATIONS		NO. OF DEATHS	MORTALITY
1926	1150	1027 major 123 minor	39	3.4 per cent
1927	1274	1167 major 107 minor	44	3.45 per cent
1928	1202	1034 major 168 minor	38	3.15 per cent
1929	1168	1023 major 145 minor	52	4.5 per cent
1930	1228	1057 major 171 minor	40	3.3 per cent
Total	6022		213	3.5 per cent

TYPE OF PATIENTS

At the Cook County Hospital all the patients are charity patients. This means that a large proportion of them are admitted in very poor

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physical condition. Usually they have an advanced condition of the illness which forces them to go to the hospital and many of them are poor operative risks. In many cases, necessary operations are deferred until the patient's general condition can be built up by bed rest, proper food, care of the bowels, care of the teeth, and when necessary blood transfusions. Most of the patients operated upon on the gynecologic service were kept in the hospital at least four days before their operation was done. Women who had an elevation of temperature were usually kept in bed and operation postponed until the temperature was normal for at least five days. In some cases this rule was not observed, some women being operated upon in spite of a slight fever, but in other instances, operation was deferred for a much longer time than five days. Consultations with attending physicians in other departments were seldom had, except for gross abnormalities of nongynecologic conditions.

About half of all the patients on the gynecologic service are negroes, and many of them as well as a fair number of white women have a four-plus Wassermann reaction. A very large proportion of the negroes have more or less extensive pelvic inflammatory disease associated with other gynecologic conditions, and this has a distinct tendency to increase the risks of operation.

Some patients were operated upon by the gynecologists for conditions which were not gynecologic. Thus several of the patients with intestinal obstruction were brought to the operating room as emergency cases and operated upon by the gynecologists. Likewise patients with appendiceal abscesses, gall bladder conditions, and urologic afflictions were operated upon on the gynecologic service. All these cases and the fatalities are included in the present analysis.

The 6,022 operations reviewed were performed essentially by the six attending gynecologists. A moderate number were done by two alternates and a fair proportion were performed by the senior internes under the supervision of the attending physicians.

MORTALITY ACCORDING TO TYPE OF OPERATION PERFORMED

A list of the most frequent operations performed and the mortality associated with these operations is given in Table II.

In Table II is listed only the most important operation which each patient had. Frequently the operation given in the table was only one of two or more operations. Thus, most of the women who had a suspension of the uterus also had a plastic operation or a dilatation and curettement or an appendectomy, but only the suspension is listed in the table. Not infrequently the accessory operation and not the chief operation was the one which caused the death. Thus, it occasionally happened that the removal of an appendix caused the death of a patient who might otherwise have recovered.

The most frequently performed operation was abdominal supracervical hysterectomy. Most of these uteri were removed because of fibroids.

The adnexa were normal and were therefore left in place. The removal of the body of the uterus alone even if it is very large is usually a simple procedure and accounts for the low mortality of 0.8 per cent for the 747 operations.

TABLE II. MORTALITY FOR THE DIFFERENT OPERATIONS PERFORMED

TYPE OF OPERATION	NUMBER	DEATHS	MORTALITY PER CENT
Abdominal supracervical hysterectomy	747	6	0.8
Abdominal supracervical hysterectomy, bilateral salpingo-oophorectomy	661	59	8.9
Abdominal panhysterectomy, bilateral salpingo-oophorectomy	350	15	4.3
Abdominal defundation of uterus and salpingectomy	449	18	4.0
Abdominal panhysterectomy	201	11	5.5
Suspension of uterus	535	4	0.7
Salpingectomy	344	6	1.7
Salpingo-oophorectomy	281	7	2.5
Vaginal plastic operations	329	4	1.2
Vaginal panhysterectomy	158	3	1.9
Exploratory laparotomy	133	7	5.3
Appendectomy	123	3	2.4
Oophorectomy	115	4	3.5
Colpotomy	89	8	9.0
Trachelorrhaphy or amputation of cervix	76	2	2.6
Myomectomy (abdominal and vaginal)	53	3	5.7
Biopsy	31	12	38.7
Colostomy	14	11	78.6
Vulvectomy	13	2	15.4
Watkins-Wertheim interposition	21	0	0
Cholecystectomy	8	0	0
Vesicovaginal fistula	7	1	14.3
		186	

On the other hand operations complicated by the presence of tubal and ovarian infections are attended by a high mortality. Thus, among the 661 operations where both the body of the uterus and the adnexa were removed, the death rate was 8.9 per cent. In the large proportion of these cases, the adnexa were inflamed, thickened, and adherent to near-by structures and organs. Frequently their removal was a dangerous procedure because of their adherence to the bowel or bladder. In many of the cases the uterus was amputated only because both tubes and ovaries were so badly diseased that they had to be removed, whereas in other cases, the indications for the hysterectomy was the presence of fibroids, fibrosis uteri, etc.

There were 350 operations in which the body of the uterus, the cervix, and the adnexa were removed and the mortality was 4.3 per cent. In most of these cases either the cervix was diseased, the adnexa were pathologic, cancer of the body of the uterus was present, or there were fibroids.

The large group of 449 defundations was performed almost exclusively in young women who had bilateral salpingitis. The purpose of this op-

eration was to remove the tubes and the fundus, so that all the diseased portions might be eliminated. One or both ovaries was left and also a sufficient portion of the body of the uterus, so that the woman might menstruate. In the group of 449 defundations, there was a death rate of 4 per cent.

Abdominal panhysterectomy was performed 201 times and the mortality was 5.5 per cent. This is a high death rate for a relatively simple operation. Most of these cases were fibroids associated with pathologic cervices.

In the series of vaginal panhysterectomies, the mortality was 1.9 per cent. This was one-third the death rate for the group of uncomplicated abdominal panhysterectomies. The number of vaginal hysterectomies was not greater because a large proportion of the women, especially the negroes have pelvic inflammatory disease which makes vaginal operations difficult and dangerous to perform.

The 133 exploratory laparotomies had the high death rate of 5.3 per cent, but this was chiefly due to the fact that many of the patients had inoperable cancers or other conditions apart from the operation which caused their death.

The mortality for the 115 oophorectomies is high as is also the death rate for the 89 colpotomies, for the 53 myomectomies, and for some other operations. There were many fatalities among the biopsy cases because many of these patients had inoperable carcinomas. The pieces of tissue were removed not only from the cervix, but also from the vulva, the rectum, and from within the abdomen.

The death rate for the colostomy operations was necessarily high because nearly all these patients were brought to the operating room in critical condition as emergency cases due to intestinal obstruction. The vulvectomy operations were performed for cancer of the vulva or for kraurosis vulvae.

TABLE III. OPERATIONS PERFORMED ON REMAINDER WHO DIED

Resection of intestines	6
Plastic on tubes	3
Removal of Bartholin abscess	2
Cauterization of ovaries	2
Dilatation and curettement	2
Abdominal and vaginal drainage	1
Repair of bowel	1
Transplantation of ovary	1
Panhysterectomy and ligation of veins	1
Panhysterectomy and radium	1
Removal of papilloma of bladder	1
Repair of ventral hernia	1
Drainage of perinephritic abscess	1
Closure of vaginofecal fistula	1
Repair of rectovaginal fistula	1
Lymphangoplastic	1
Hemorrhoidectomy	1
	27

A list of the operations performed on the 27 fatal cases not included in Table II is shown in Table III.

ANALYSIS OF DIAGNOSES

The operative diagnosis of the 213 deaths is listed in Table IV. The largest number of deaths occurred following operations for fibroids of the uterus, pelvic inflammations, and malignancy.

TABLE IV. OPERATIVE DIAGNOSIS OF THE FATAL CASES

Fibroid uterus	69
Salpingitis and pelvic inflammation	65
Malignancy	31
Ovarian cyst	13
Intestinal obstruction	11
Cystocele and rectocele	8
Appendiceal abscess	3
Fistula	3
Prolapse of uterus	2
Pyometrium	2
Bartholin gland abscess	2
Ventral hernia	1
Hemorrhoids	1
Perinephritic abscess	1
Pregnancy	1
	213

The operations performed on the 69 fatal fibroid cases are given in Table V.

TABLE V. OPERATIONS FOR THE 69 FIBROID CASES

TYPE OF OPERATION	NUMBER
Abdominal supracervical hysterectomy, bilateral salpingo-oophorectomy	43
Abdominal panhysterectomy	10
Abdominal panhysterectomy, bilateral salpingo-oophorectomy	3
Abdominal supracervical hysterectomy, bilateral salpingectomy, unilateral oophorectomy	4
Myomectomy	3
Abdominal supracervical hysterectomy	4
Defundation, bilateral salpingectomy	2
	69

The causes of death in these 69 cases are shown in Table VI.

TABLE VI. CAUSE OF DEATH IN THE FIBROID CASES

CAUSE OF DEATH	NUMBER	PER CENT
Peritonitis	35	50.8
Embolism	9	13.0
Hemorrhage and shock	8	11.6
Myocardial failure	7	10.1
Pneumonia	5	7.2
Uremia	2	2.9
Pyelocystitis	1	1.4
Encephalitis or meningitis	1	1.4
Acute dilatation of stomach	1	1.4
	69	

The high frequency of peritonitis after the operations for fibroids in this series may be explained partly by the presence of extensive pelvic inflammatory lesions which were frequently associated with the fibroids, especially in the negroes. Furthermore, many of the fibroid masses were unusually large, many were adherent to the bowel and bladder, some were intraligamentous, and a few protruded into the vagina. In 21 of the 69 cases the appendix was removed, and how much of a factor this was in causing some of the deaths, it is difficult to say.

Embolism occurred in 9 of the fibroid cases, and whereas only 69 of the 213 (32.4 per cent) patients who died had fibroids, 9 of the 18 deaths from embolism (50 per cent) occurred in the fibroid series.

Postoperative hemorrhage and shock are placed together because it was difficult to tell when one or the other was responsible for the death. Part of this mortality was due to faulty technic and part to the anemic condition and other abnormalities of some of these patients.

Myocardial failure was responsible for one-tenth of the deaths in the fibroid group. This is not unexpected when we recall that many patients with large fibroids have some affliction of the cardiac musculature. The remaining deaths in the fibroid group require no special explanation.

There were 65 deaths following operations for pelvic inflammations. Most of these infections were due to gonorrhea, but some were due to tuberculosis and others were puerperal in origin. The operations for these 65 cases are listed in Table VII.

TABLE VII. OPERATIONS FOR THE 65 INFLAMMATORY CASES

TYPE OF OPERATION	NUMBER
Defundation, bilateral salpingectomy	16
Abdominal supracervical hysterectomy, bilateral salpingectomy, unilateral oophorectomy	11
Bilateral salpingectomy, unilateral oophorectomy	9
Posterior colpotomy	8
Bilateral salpingectomy	6
Abdominal supracervical hysterectomy, bilateral salpingo-oophorectomy	4
Abdominal panhysterectomy, bilateral salpingo-oophorectomy	4
Unilateral salpingo-oophorectomy	4
Exploratory laparotomy	3
	65

The cause of death in these 65 cases is shown in Table VIII.

TABLE VIII. CAUSE OF DEATH IN THE INFLAMMATORY CASES

CAUSE OF DEATH	NUMBER	PER CENT
Peritonitis	40	61.5
Hemorrhage and shock	14	21.5
Pneumonia	6	9.2
Embolism	2	3.1
Myocardial failure	1	1.5
Septicemia	1	1.5
Cachexia	1	1.5
	65	

It is not surprising to find that the majority of the fatalities were due to peritonitis, for in most of the cases in this group, a mild or severe degree of peritonitis had been present before operation. Of course, in the large proportion of the cases, the peritonitis was not an active one, but in a few cases there was evidence of active inflammation in spite of long rest in bed to overcome this.

In this group of 65 operations the appendix was removed 31 times. Undoubtedly in some of these cases where an appendectomy was performed, this operation played a rôle in leading to a fatal issue.

Hemorrhage and shock were responsible for 21.5 per cent of the deaths in the inflammatory group in contrast to 11.6 per cent in the fibroid cases. This may be due to the prolonged operations sometimes necessary in cases with extensive inflammation and also to the large exposed raw surfaces from which the blood oozing is sometimes controlled with difficulty. On the other hand embolism occurred in only 3.1 per cent of the inflammatory group in contrast to 13 per cent in the fibroid series. Likewise, myocardial failure accounted for 1.5 per cent of the former deaths in contrast to 10.1 per cent in the fibroid group.

The 31 malignancies consisted of:

1. Carcinomas of the cervix, the body of the uterus, the ovaries, the rectum, the sigmoid, the transverse colon, the cecum, the bladder, the vulva, and generalized carcinomatosis.

2. Sarcomas of the uterus, the broad ligament, the small intestine, and the vulva.

3. Teratomas of the ovary.

The eleven intestinal obstruction cases were treated by various means including, colostomy, ileostomy, resection of bowel and in one case only an exploratory operation and biopsy were done.

THE CAUSES OF DEATH IN THE 213 CASES

Almost half of all the fatalities were due to peritonitis and ileus, and these are listed together because whenever an ileus occurred peritonitis

TABLE IX. CAUSES OF DEATH FOR ALL CASES

CAUSE OF DEATH	NUMBER	PER CENT
Peritonitis and ileus	104	48.8
Hemorrhage and shock	35	16.4
Embolism	18	8.5
Pneumonia	18	8.5
Malignancy and cachexia	16	7.5
Myocardial failure	12	5.2
Uremia	2	0.9
Cerebral thrombosis	1	0.5
Acute dilatation of stomach	1	0.5
Septicemia	1	0.5
Pyelocystitis	1	0.5
Gas gangrene of pelvis	1	0.5
Pellagra	1	0.5
Encephalitis or meningitis	1	0.5
Pyemia	1	0.5
	213	

was also present. As mentioned previously, some of the patients had peritonitis before they were operated upon and died as a result of this rather than as the direct result of their operation. Several of the deaths from peritonitis were directly attributable to injuries which occurred to the bowel, bladder, and ureters during the operations. Two women in the peritonitis group had diabetes which was aggravated by their operation.

Hemorrhage and shock accounted for 16.4 per cent of all the fatalities. Usually the excessive loss of blood occurred during the operation, but in 12 cases there was serious postoperative bleeding. In most cases hemorrhage was the cause of shock but in others the causative factor of the shock was a prolonged operation, a long ether anesthesia or trauma during operation.

There were 18 cases of embolism (8.5 per cent) and half of these occurred after the 69 operations for uterine fibroids.

At least 95 per cent of the 6,022 operations were performed under ether anesthesia. Very few were done under spinal or direct infiltration anesthesia and a few patients had nitrous oxide and oxygen. Since there were 18 deaths from pneumonia in the entire series, the approximate incidence of this complication after ether anesthesia was almost 0.3 per cent. It is of course not maintained that the ether anesthesia was responsible for all the cases of pneumonia in this series. However, pneumonia is distinctly less frequent after the use of local anesthesia.

Malignancy and cachexia were usually associated, and they were put down as the cause of death when patients remained in the hospital a long time after operation and lost ground constantly without demonstrating any gross pathologic lesion other than the malignancy.

The remainder of the causes of death are self-explanatory.

COMPLICATIONS DURING OPERATION

The serious complications which occurred during operation are listed in Table X.

TABLE X. COMPLICATIONS DURING OPERATION

Ureter cut	4
Ureter ligated	1
Bladder torn	2
Sigmoid torn	2
Small intestines torn	2
Rectum torn	1
Hemorrhage during vaginal hysterectomy necessitating laparotomy	2

TABLE XI. SERIOUS POSTOPERATIVE COMPLICATIONS

Intraabdominal hemorrhage	12
Fecal fistula	7
Evisceration	5
Hemorrhage from vagina	1
Hemorrhage from cervix	1
Vesicoabdominal fistula	1
Bleeding from wound	1
Emphysema of abdominal wall	1

TABLE XII. INTERVAL BETWEEN OPERATION AND DEATH

Less than 24 hours	13	11-15 days	21
1 day	19	16-20 days	7
2 days	18	21-25 days	2
3 days	19	26-30 days	3
4 days	24	31-40 days	3
5 days	18	41-50 days	5
6 days	17	51-60 days	4
7 days	13	87 days	1
8 days	7	108 days	1
9 days	12		
10 days	6		213

Practically all the bladder and bowel injuries occurred in cases where there were extensive adhesions between inflamed adnexa and the bowel and bladder.

SUMMARY

In a series of 6,022 operations performed on the gynecologic service of the Cook County Hospital there were 213 deaths, an incidence of 3.5 per cent. All the patients were charity patients and about 50 per cent of them were negroes.

The mortality rates for the largest groups of operation were as follows: For the 747 abdominal supracervical hysterectomies, it was 0.8 per cent; for the 661 abdominal supracervical hysterectomies with bilateral salpingo-oophorectomies, it was 8.9 per cent; for the 350 abdominal panhysterectomies with removal of both adnexa, it was 4.3 per cent; for the 449 defundations with salpingectomy, it was 4 per cent; for the 201 abdominal panhysterectomies, it was 5.5 per cent; and for the 158 vaginal hysterectomies, it was 1.9 per cent.

The most frequent operative diagnoses in the fatal cases were fibroid uterus 69, salpingitis and pelvic inflammation 65, malignancy 31, ovarian cyst 13, and intestinal obstruction 11.

The commonest causes of death in the fibroid group were peritonitis 50.8 per cent; embolism 13 per cent, hemorrhage and shock 11.6 per cent, myocardial failure 10.1 per cent, and pneumonia 7.2 per cent. The chief causes of death for the inflammatory group were peritonitis 61.5 per cent, hemorrhage and shock 21.5 per cent, pneumonia 9.2 per cent, and embolism 3.1 per cent.

The most frequent causes of death for the entire series of 213 cases were as follows: peritonitis and ileus 48.8 per cent, hemorrhage and shock 16.4 per cent, embolism 8.5 per cent, pneumonia 8.5 per cent, malignancy and cachexia 7.5 per cent, and myocardial failure 5.2 per cent.

There were 14 serious complications during operation and 29 grave complications after operation.

CONCLUSIONS

1. The histories and progress notes should be much more complete than they are at present, and the attending physicians should add notes as well as the internes.

2. The patients should receive more preparation and have more tests made before operation. The sedimentation test should be employed routinely in inflammatory cases.

3. There should be more consultations with attending physicians in other services, especially the medical and urologic.

4. There should be more transfusions before operation, especially when there is to be an extensive operation.

5. Local anesthesia either by direct infiltration or by the spinal route should be used more frequently for selected cases.

6. No operation should be performed until the temperature has been normal at least ten days, except in rare cases.

7. The number of unnecessary appendectomies may be reduced with advantage.

8. Postoperative care should be supervised more closely.

9. An effort should be made to secure more autopsies.

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POSTMENOPAUSAL BLEEDING*

A Survey of 98 Consecutive Cases

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INASMUCH as bleeding from the vagina occurring after the menopause is frequently treated symptomatically and passed over as being of little or no significance, the authors deemed it of interest to analyze the etiologic factors responsible for this type of bleeding in all the case records from the gynecologic services at the Presbyterian and Cook County Hospitals for the year 1930. During that year 98 patients were admitted to these services with postmenopausal bleeding as part of, or as the entire symptom-complex.

The causes of this type of bleeding in the order of their frequency are as follows: carcinoma (67 cases), cervical polyps (8 cases), fibromyomas (7 cases), prolapse of the uterus (5 cases), senile vaginitis (3 cases), cervical erosion (3 cases), urethral caruncle (2 cases), fibrosis of the uterus (2 cases), and nonspecific ulcer of the vagina (1 case). Analyzing the carcinomas in this series we find that 51 were cervical, 11 were in the body of the uterus, 2 were on the vulva, 1 was in the vagina, 1 was in the ovary, and 1 was a zona granulosa tumor of the ovary. Of the fibromyomas, 4 patients had multiple fibroids while the other 3 had the single submucous type. Thus, in this series, 68.4 per cent of the cases were of

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a malignant nature and 31.6 per cent were benign. Table I gives an analysis of these figures together with the percentages of each condition as found.

TABLE I. DIAGNOSES AND PERCENTAGES

DIAGNOSIS	NUMBER OF CASES	PER CENT OF TOTAL
Carcinoma of the cervix	51	52.08
Carcinoma of the corpus	11	11.22
Carcinoma of the vagina	1	1.02
Carcinoma of the ovary	1	1.02
Carcinoma of the vulva	2	2.04
Zona granulosa tumor	1	1.02
Senile vaginitis	3	3.06
Urethral caruncle	2	2.04
Fibromyomas	7	7.14
Erosion of the cervix	3	3.06
Prolapse of the uterus	5	5.10
Polyps of the cervix	8	8.14
Ulcer of the vagina	1	1.02
Fibrosis of the uterus	2	2.04
Totals	98	100.0

Age.—The age incidence of bleeding after the menopause (Table II), reveals that the greatest number of the patients are between the ages of fifty and sixty. Of the 98 case records studied, 58 fall into this class, one

TABLE II. AGE INCIDENCE

AGE	NUMBER OF PATIENTS
48	1
49	0
50	6
51	6
52	6
53	5
54	4
55	5
56	6
57	3
58	4
59	5
60	8
61	4
62	5
63	4
64	2
65	2
66	3
67	1
68	2
69	2
70	2
71	2
72	2
73	1
74	2
75	2
76	2
77	1

TABLE III. NUMBER OF YEARS AFTER MENOPAUSE

YEARS IN MENOPAUSE	NUMBER
1	4
2	4
3	2
4	5
5	4
6	1
7	4
8	6
9	2
10	11
11	4
12	9
13	1
14	6
15	3
16	6
17	2
18	2
19	2
20	5
21	4
22	1
23	1
24	2
25	2
26	2
30	2
31	1

patient was under fifty, 27 were between the ages of sixty-one and seventy, while 12 were over seventy. The youngest patient in this series was forty-eight years of age, while the oldest was seventy-seven.

The number of years bleeding first occurred after the menopause was established, is shown in Table III. Bleeding may occur as early as the first year after the cessation of the menses and as long after that time as thirty-one years. The greatest numbers for any single year after the menopause occurred in the tenth and twelfth years, 11 and 9 respectively.

Parity.—The parity of the individuals studied is found in Table IV. This table is divided into two columns, one showing the relation of parity to carcinomas and the other to the nonmalignant conditions considered.

TABLE IV. RELATION OF PARITY TO POSTMENOPAUSAL BLEEDING

PARITY	CARCINOMATA	NONMALIGNANT
0	7	2
1	6	5
2	9	6
3	12	4
4	4	5
5	6	4
6	9	1
7	1	1
8	1	2
10	3	2
11	2	1
12	1	2
13	1	0
16	1	0

Type of Bleeding.—There were four types of bleeding complained of by the patients, namely: bloody stained leucorrhea, spotting, moderate in amount, and profuse with sizable hemorrhage and passage of large clots. Only four of the patients had a blood stained discharge, 38 had spotting, 28 had a moderate amount of bleeding, and 28 had profuse bleeding. Table V shows the relationship between the type of bleeding and the pathology present.

TABLE V. RELATION OF TYPE OF BLEEDING TO CAUSATIVE CONDITION

CONDITION	DISCHARGE	SPOTTING	MODERATE	PROFUSE
Carcinoma of cervix	2	16	17	16
Carinoma of corpus	0	4	1	6
Carcinoma of vagina	0	1	0	0
Carcinoma of vulva	0	0	1	1
Carcinoma of ovary	0	0	1	0
Zona granulosa	0	0	1	0
Senile vaginitis	0	3	0	0
Urethral caruncle	0	1	1	0
Fibromyomas	0	4	0	3
Cervical erosion	0	3	0	0
Prolapse	1	2	1	1
Cervical polyp	1	3	4	0
Nonspecific ulcer	0	1	0	0
Fibrosis of uterus	0	0	1	1

Duration of Bleeding.—The great majority of the patients in this group presented themselves for treatment within one year of the time of the onset of the bleeding. Only eleven histories in the entire group stated that the patients had been bleeding for over one year, while 53 of them were seen within the first six months after the symptom showed itself. Table VI shows the length of time the various patients had bled before seeking specialized medical attention.

TABLE VI. DURATION OF BLEEDING BEFORE PRESENTATION IN HOSPITAL

ELAPSED TIME	NUMBER OF PATIENTS
1 month or less	12
2 months	10
3 months	9
4 months	6
5 months	5
6 months	11
7 months	5
8 months	2
9 months	2
10 months	1
11 months	2
1 year	22
2 years	9
3 years	2

Menstrual Life.—Although not entirely relevant to the subject in hand, we are able to tabulate some very interesting statistics on the age of onset of the menopause and the duration of menstrual life in this group of patients. We find that the earliest menopause in the series occurred at the age of thirty, while the latest cessation of menses took place at the age of fifty-seven. The largest number stopped menstruat-

TABLE VII. AGE AT MENOPAUSE

AGE AT MENOPAUSE	WHITE	COLORED
30	0	1
35	1	0
36	1	0
38	1	0
39	0	3
40	2	1
41	2	0
42	2	0
43	2	1
44	2	0
45	11	3
46	2	1
47	9	0
48	10	2
49	4	2
50	14	6
51	5	1
52	2	0
53	1	1
55	3	0
57	1	1

ing between the ages of forty-five and fifty-one. The shortest duration of menstrual life here encountered was seventeen years, while the longest was forty-three years. Of particular interest is the obstetric history of some of these patients. The patient who menstruated only seventeen years was a nulliparous individual, while the one who had an 18-year span of active menstrual life had had six children. The woman who menstruated through a period of forty-three years also had six children; one who menstruated for forty-one years had had one child; the three patients who menstruated forty years were para 1, 8, and 16, and finally the patient who had a thirty-nine year menstrual life was a nulligravida. Table VII shows the age at the onset of the menopause, and Table VIII shows the duration of menstrual life. In Table VII we have divided the white and the colored patients into separate columns in order that we might have a basis of comparison between the two races in regard to this particular subject. The average length of menstrual life as found in this series is 28.07 years.

TABLE VIII. DURATION OF MENSTRUAL LIFE

YEARS OF MENSTRUATION	NUMBER
17	1
18	1
20	1
21	1
24	2
25	3
26	1
27	2
28	1
29	5
30	4
31	3
32	11
33	6
34	7
35	6
36	13
37	6
38	7
39	1
40	3
41	1
43	1

Another interesting observation made in the review of these cases is the fact that one of the patients who presented herself with a carcinoma of the cervix had had a supracervical panhysterectomy for multiple fibroids just two years previous to the development of the symptoms from her carcinoma.

DISCUSSION

Causes of postmenopausal bleeding not actually encountered in this series but which must be looked for in a thorough examination of the

pelvis are senile endometritis, simple cystadenoma of the ovary, sarcoma of the ovary, torsion of the pedicle of an ovarian cyst, pyometra, foreign bodies in the vagina or uterus, and carcinoma of the fallopian tube.

The diagnosis of most of these conditions can readily be made by bimanual palpation and direct inspection of the vagina and cervix through a speculum. When neither of these procedures gives us a successful diagnosis, a diagnostic curettage with careful study of the recovered material is indicated. If this proves of no avail a posterior colpotomy incision can be made and the adnexal regions brought into view for direct inspection, because the zona granulosa tumor or early ovarian carcinomas which may be too small for palpatory detection, can, in this manner be determined. The type of bleeding present is of no value in the determination of the prevailing cause as we can see by Table V.

The idea that certain lesions of the uterus or ovary are capable of exciting cyclic endometrial activity after the menopause has been established is very doubtful. Some believe that the zona granulosa tumor of the ovary is capable of doing this, but the most likely cause of the bleeding when this condition is present is a coexisting carcinoma of the endometrium. Herd studied the ovaries of twenty patients who had postmenopausal cysts or carcinomas, and in only one instance did he find evidences of ovarian activity. That patient had a sarcoma of the endometrium as the probable cause of the bleeding.

In a large number of cases of postmenopausal bleeding, the exciting factor is constant irritation or contact, as is manifested in the bleeding from urethral caruncles, senile vaginitis, erosions of the cervix, cervical polyps, and foreign bodies in the vagina or cervix. As an added factor in cervical polyps or fibrosis of the uterus, arterial hypertension may be of significance. In the submucous fibroid or fibroid polyp, bleeding is due to a change in the capsule of the tumor or an ulceration in a congested part of the polyp. In malignancy of the cervix or corpus uteri, the ulceration caused by direct invasion of the malignant cells with secondary infection is the factor responsible for the bleeding. Large ovarian cysts, malignant or benign, or a moderate-sized cyst with twisting of its pedicle produce bleeding by causing a marked generalized pelvic congestion. Our conception of the cause of the bleeding in the rare zona granulosa tumor of the ovary is stated in the preceding paragraph.

SUMMARY

1. Inasmuch as 68.4 per cent of the patients in our series with postmenopausal bleeding had conditions of a malignant nature, the axiom, "All cases of postmenopausal bleeding should be considered as malignancies until proved otherwise," is very significant.

2. The possible causes of postmenopausal bleeding are: carcinoma of the cervix, carcinoma of the corpus uteri, carcinoma of the vagina, carcinoma of the vulva, carcinoma of the ovary, zona granulosa tumor of

the ovary, senile vaginitis, urethral caruncle, fibroids of the uterus, cervical erosions, prolapse of the uterus, cervical polyps, fibrosis uteri, nonspecific ulceration of the vagina, senile endometritis, sarcoma of the ovary, large cysts of the ovary, pyometra, twisting of the pedicle of an ovarian cyst, foreign bodies in the vagina or uterus, and carcinoma of the fallopian tube.

3. Once the menopause has been definitely established (no menses for a period of six months to one year) all bleeding from the genitals should be considered as abnormal.

4. There is no apparent relationship between the type or amount of bleeding and the seriousness of the existing condition.

5. Parity, length of time in the menopause, and duration of active menstrual life are of no particular value as diagnostic aids.

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310 South Michigan Avenue.

COMPLETE INVERSION OF THE UTERUS AND CERVIX*

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Mrs. G. S. (Hist. No. 38060.) Color, white, aged twenty-two, occupation, housewife, entered the hospital March 4, 1931. Chief complaint: prolapse of uterus associated with bleeding. Present illness: On May 5, 1930 patient gave birth to her third child after a full-term normal pregnancy and normal labor. The third stage of labor was unduly prolonged. Patient does not believe she received any medication to expedite labor. Her attending physician exerted strong traction on the cord which produced a sharp pain in the lower left quadrant. He scraped the placenta from the uterus manually and told her that the womb had slipped out of the vagina. An unsuccessful attempt was then made to replace the womb which was associated with a moderate loss of blood but no loss of consciousness. She was kept in bed in the Trendelenburg posture for three weeks and then lay in the lateral position for seven weeks longer. Bleeding was not marked throughout this time. She gives no history of a severe febrile course.

At the end of eleven weeks she attempted to get out of bed and noticed a reddish globular mass extruding from the vagina for a distance of two or three inches. On attempting to walk there was a fairly profuse bleeding. Her physician gave her a sort of truss which was designed to keep the uterus within the vagina but she was unable to wear it on account of tenderness. Her condition remained the same for the next five months. She was forced to remain in bed most of the time because of

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marked vaginal bleeding upon even slight exertion. She became very weak and dizzy but has never lost consciousness. Constant oozing continued until admission to the hospital. Her past history and menstrual history are of no importance or interest. She had been married for four years. Husband living and well. There have been three pregnancies and two living children. The last baby died at three months of age of dysentery. Family history is of no importance.

The patient was fairly well developed but poorly nourished. She was not acutely ill or uncomfortable. Skin was pale but warm and dry. Mucous membranes showed marked pallor. She was moderately intelligent and cooperative.

The physical examination was essentially negative except a systolic blowing over the precordium, loudest in the pulmonic area. Blood pressure 128/78; pulse soft and equal, rate 120.

Fig. 1.—Complete inversion of uterus and cervix. One tube and ovary were removed; the other appendage was left in situ.

Pelvic examination, external genitals were negative, vaginal outlet moderately relaxed. Filling the vagina was a purplish pear shaped mass seemingly covered with mucous membrane which bled profusely on manipulation. On bimanual examination the uterus could not be palpated in the pelvis, but there could be felt a cup-shaped depression beneath the symphysis. Traction on the tumor caused it to be pulled outside of the vaginal outlet. It seemed to be a complete inversion of the uterus. The openings of the fallopian tubes could not be demonstrated.

Clinical laboratory: urine negative; R.B.C. 2,630,000; W.B.C. 7,050; Hg 42 per cent (Sahli); Wassermann and Kahn negative; Phenolsulphonephthalein output 50 per cent the first hour, second hour specimen not collected; sedimentation time sixty minutes; temperature on admission 99.6; pulse 120; respiration 20.

Preoperative diagnosis: inversion of the uterus, complete, and secondary anemia.

Under gas-oxygen anesthesia an unsuccessful attempt was made to reduce the in-

version. During the next week three blood transfusions were given which finally brought the R.B.C. to 5,000,000; Hg 78 (Sahli).

On March 18, 1931 a vaginal hysterectomy and salpingo-oophorectomy, unilateral, were carried out, which was ten months and thirteen days after she was delivered. Her postoperative course was uneventful. The patient was discharged in good condition April 2, 1931.

Microscopic examination of the specimen showed the endometrium contained only one to two glands per high power field. The epithelium was indistinct, no cellular detail in glands or stroma. Final diagnosis: beginning necrosis of the endometrium.

2112 West End Avenue

CARCINOMA AND SARCOMA COEXISTING IN THE SAME UTERUS*

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THE development of both of these tumors in the same uterus is exceedingly rare. Ewing reports ten cases in which a sarcoma and carcinoma were found in the same uterus. Most of these were polypoid sarcoma associated with diffuse adenocarcinoma. The case which I have to report is of this same type. In a complete review of the literature in 1929, Newell found only twenty cases in which a sarcoma and a carcinoma were coexisting in the same uterus.

Clinical History.—Mrs. G. G. R., aged fifty-six years, was first seen January 27, 1930, complaining of vaginal bleeding. The family history was irrelevant. The patient had had four term pregnancies, one child died with rheumatic fever and three children are living and well. There were no miscarriages. Her menstrual periods began at the age of thirteen years and were normal up to the menopause which was delayed until the age of fifty. Since the menopause she has had slight periods of bleeding about once a year lasting a few days. During the last two years she had noticed considerable watery discharge which was at times blood tinged. During the last two months there had been definite vaginal bleeding, and ten days before I first saw her, she passed a piece of tissue, which was associated with a severe hemorrhage. This was sent by her physician for examination and found to be a broad spindle cell sarcoma. She did not know her average weight, but weighed 218 pounds on my office scales. She had noticed some loss of appetite. There had been no abdominal pain.

The physical examination was essentially negative excepting for a moderate elevation of blood pressure to 150/90 and the pelvic findings. The abdominal wall was so fat and pendulous that nothing could be determined by palpation. Vaginal examination revealed a slightly hypertrophied cervix with a small erosion on the posterior lip. This erosion did not bleed and did not have the appearance of being malignant. The uterus was uniformly enlarged to about the size of a two months' pregnancy and was moderately movable in the pelvis. The adnexa could not be palpated. There was a thin bloody discharge present at the time of the examination.

The laboratory examination showed a red blood count of 4,170,000, hemoglobin 72 per cent, and a white blood count of 7,900. The urine was negative.

Operation.—January 31, 1930. Abdominal hysterectomy, bilateral salpingo-oophorectomy. A midline incision was made from symphysis to umbilicus. Upon opening the abdominal cavity the uterus was found to be uniformly enlarged to about

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*Read before the Central Association of Obstetricians and Gynecologists, Chicago, October 29 and 30, 1931.

the size of a two months' pregnancy. There had been a very marked old inflammatory process involving the left adnexa and parametrium, making it difficult to lift the uterus up out of the pelvis even after the adhesions were freed. We, of course, started the operation with the intentions of doing a panhysterectomy, but with the mechanical difficulties of an extremely fat abdominal wall, a deep pelvis, and dense adhesions, together with the fact that the patient did not seem to be standing the operation well, we decided to amputate the uterus, leaving as little of the cervix as possible, and closed the abdomen. In other words, I felt that I would rather have the patient recover from the operation and take a chance on a recurrence in the cervical stump, than to have the complete specimen and have the patient die from the operation. Accordingly the uterus with both tubes and ovaries was removed, the uterus being amputated below the level of the internal os. The round and infundibulopelvic ligaments were sutured into the cervical stump and the bladder peritoneum was used to cover the raw surfaces. The abdomen was closed, without drainage, in the usual manner.

The postoperative course was fairly smooth and the patient was out of bed on her fourteenth day.

Subsequent Course.—The patient had four deep x-ray treatments over the pelvis during the following month. I have examined this patient several times since her operation and have found the cervix and pelvis free from any evidence of recurrence. The last examination was made twenty-one months following the operation. The patient was feeling well, in good health, and weighed 234 pounds, which was a gain of sixteen pounds above her weight before the operation.

Pathologic Examination.—Gross appearance: The uterus which was amputated supracervically measured 8 by 8 cm. The lumen was very much dilated and a polyp with a base of 2.5 cm. and a height of 4.5 cm. was protruding from the lower half of the corpus. The consistency of the polyp was soft. It was brain-like in color.

Microscopic findings. The polyp was composed of strands of large short oval cells. They had different size and staining quality of the vesicular nucleus. There were some mitotic figures. The endometrium was invaded by an adenocarcinoma with long branching glands lined with atypical dark cells in several rows. The adenocarcinoma was invading deeply into the myometrium. Sections from the cut surface of the cervix showed a narrow area of normal cervical glands and muscle tissue not invaded by carcinomatous tissue.

Pathologic Diagnosis.—Sarcomatous polyp. Adenocarcinoma of the body of the uterus.

One can easily see how difficult it is to make an accurate diagnosis when two malignancies spring from the interior of the uterine cavity and encroach upon each other in such a way that the cells may lose their characteristics. It is not so difficult however, in the case reported, because sections are found showing each type of malignancy distinct and separate from the other.

The author wishes to take this opportunity to express his indebtedness and thanks to Dr. C. A. Helwig, pathologist of the St. Francis Hospital, for the pathologic report.

902 Brown Building.

A CASE OF ANAPLASTIC CARCINOMA OF THE BODY OF THE UTERUS*

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IT IS the purpose of this communication to record the clinical and pathologic observations in a case of anaplastic carcinoma of the body of the uterus, and to correlate these findings with certain previous reports describing this type of tumor.

Case Report.—The patient was a white married woman, aged forty years. She had no children. There had been two pregnancies seventeen years and eighteen years previously, both of which terminated in spontaneous eight weeks' abortions.

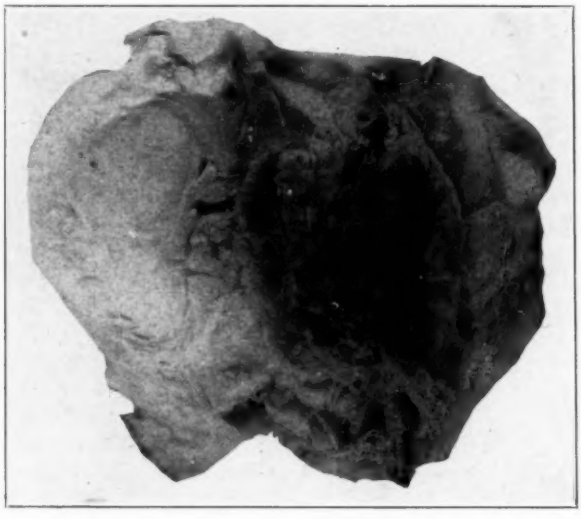

Fig. 1.—Gross specimen showing necrotic, friable tumor filling uterine cavity and several intramural myomas.

Menstruation began at the age of twelve years. The periods were of the twenty-eight day type and regular. The menstrual flow had always been somewhat profuse and the duration seven to ten days. There was no dysmenorrhea and no intermenstrual bleeding. On admission the patient stated that she had been entirely well until three months previously when she developed anorexia and began to lose weight to the extent of fifteen pounds in three months. She also suffered with increasing constipation and progressive weakness. The last menstrual period began four weeks before admission, was accompanied by marked dysmenorrhea, and the menstrual flow was unusually profuse and prolonged.

On physical examination it was found that the patient was pale, thin, and undernourished. The abdomen was relaxed and pendulous. A firm, irregular mass filled the pelvis, and extended to within 3 cm. of the umbilicus. On vaginal examination it was found that there was moderate vaginal bleeding. The cervix was intact and merged into a firm, irregular, nodular, fixed mass in the position of the uterus, and

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filling the entire pelvis. There was definite nodularity in the culdesac. Examination of the blood showed a pronounced secondary anemia: (R.B.C. 2,400,000; W.B.C. 10,850; Hb. 65 per cent). The sedimentation test showed a ten minute rate. The preoperative clinical diagnosis was multiple myomas complicated by sarcoma.

After a direct transfusion of 500 c.c. of blood, the abdomen was opened in the midline. The uterus was found to be the size of a four months' gestation. Several myomas were plainly visible in its walls. A supracervical hysterectomy was performed as a palliative measure. The patient was discharged five weeks after admission in fair condition. She died two months after operation with symptoms suspicious of pulmonary and hepatic metastases.

Pathologic Examination.—The uterus was enlarged. There were several intramural and subserous myomas varying between one and 3 cm. in diameter. Upon opening the uterus the cavity was found largely filled with, and somewhat distended by, a soft, friable, seminecrotic tumor arising in the endometrium. Some of the necrotic debris lay free in the uterine cavity.

Fig. 2

Fig. 3

Fig. 2.—Photomicrograph showing diffuse growth of anaplastic carcinoma. The cells are small and there is complete loss of polarity.

Fig. 3.—Photomicrograph showing polyhedral and small spindle cells surrounding a blood vessel, simulating the morphologic structure of a peritheliomatous growth.

Histologic Examination.—Histologic examination showed a highly cellular and malignant tumor, probably of epithelial origin. At no point was there any evidence of glandular formation. The growth was diffuse. The individual cells exhibited all the morphologic signs of anaplasia. There was marked variation in size and shape of cells and hyperchromatism of nuclei with numerous atypical mitoses throughout. The tumor cells were round, polyhedral and occasionally spindle-shaped. In some areas the cells were grouped around blood vessels giving a peritheliomatous appearance. There were several foci of giant cells of the foreign body type with highly atypical nuclei and numerous mitoses. There was no evidence of invasion of blood vessels by tumor cells. There were numerous necrotic and seminecrotic foci.

DISCUSSION

Whatever doubts may exist concerning the precise relationship between the histologic structure of tumors and their prognosis, it appears to be definitely established that the highly undifferentiated anaplastic carcinomas are usually the most malignant tumors that are encountered.

The unfavorable prognosis of highly anaplastic carcinomas following surgical procedures has been demonstrated in cases affecting the lip (Broders[1]); the tongue, tonsil, pharynx and larynx (Ewing[2]); the cervix (Broders, Martzloff,[3] Schmitz,[4] Healy and Cutler[5]); and the body of the uterus (Mahle,[6] Lindsay,[7] Norris and Vogt,[8] Healy and Cutler[9]).

In 1923 Mahle reported 186 cases of fundus carcinoma treated in the Mayo Clinic and concluded that a definite relationship existed between the histologic structure and the end-result after hysterectomy. He noted that in Grade I, the most differentiated form, no deaths occurred. Whereas in Grade IV (the anaplastic type) in which there was complete loss of differentiation, every patient died. Lindsay in 1927 analyzed a large series of cases from the Memorial Hospital and the New York Hospital and confirmed these results.

In 1930 Healy and Cutler reported 100 cases of carcinoma of the fundus uteri from the Memorial Hospital, New York. Twelve per cent were found to belong to the anaplastic type of carcinoma. Of these, six died and six lived over three years.

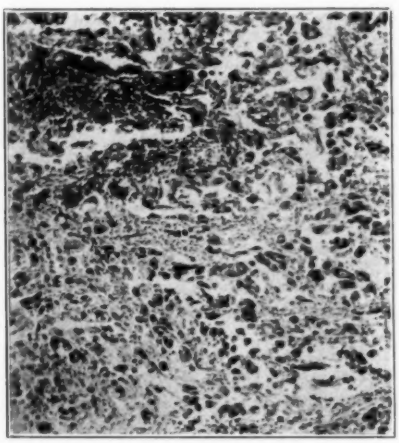

Fig. 4

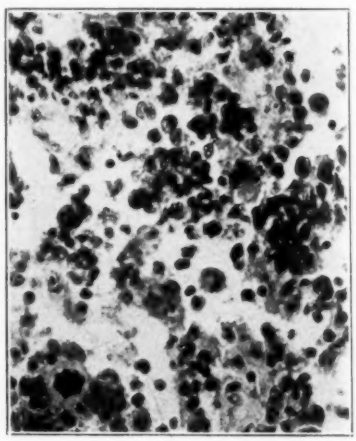

Fig. 5

Fig. 4.—Masses of giant cells with atypical, hyperchromatic nuclei. Many cells are in a state of mitosis.
Fig. 5.—High power photomicrograph showing the atypical and very active giant cells.

One patient was cured by hysterectomy, one by removal of a pedunculated growth followed by intrauterine radiation. Four patients are well after preoperative radiation followed by hysterectomy. In one case a very large tumor responded rapidly and almost disappeared entirely after radiation therapy. The patient remained well five years, after which hysterectomy was performed for suspected pyometra. On microscopic examination only nuclear remnants of tumor cells could be detected. There was no viable tissue to be demonstrated.

CONCLUSIONS

1. Anaplastic carcinoma of the body of the uterus, which forms about 12 per cent of all carcinomas affecting the uterus, is the most malignant form of fundus carcinoma. It is at the same time the most radiosensitive.

2. The prognosis in this group of cases is extremely unfavorable under all circumstances.

3. In view of their high degree of potential malignancy and their radiosensitivity, preoperative radiation is urgently indicated in all cases.

4. The method of choice in the treatment of anaplastic carcinoma of the uterus is preoperative radiation followed by hysterectomy in the operable group and radiation alone in the inoperable group.

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104 South Michigan Avenue.

URINARY TRACT CHANGES DURING LATE PREGNANCY AND EARLY PUERPERIUM*

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THE anatomic changes which take place in the kidneys and ureters during pregnancy and the late puerperium are well known. Hofbauer[10] has demonstrated the histologic changes and Duncan and Seng[4] have shown by retrograde pyelography the gross changes occurring in the urinary tract during pregnancy and the puerperium from the ninth to the twenty-fifth day postpartum, but very little is known about the events of the ten day period immediately following delivery. The introduction of intravenous urography by means of contrast material excreted through the kidneys has opened a safe method of approach to this problem.

Our investigations were directed at this immediate puerperal period, and the contrast material used was the sodium salt of iodo-methane-sulphonic acid, known in Germany as "Abrodil" and in this country as "Skiodan." The chemical formula of this compound is ICH_2SO_3Na. Bronner, Hecht and Schueller[2, 3] studied the chemical and physiologic reactions of the drug and showed that it may be employed safely for pyelographic studies repeated as often as every twenty-four hours.

METHOD

The subjects included 41 normal pregnant women, 20 primiparas and 21 multiparas. Of the latter, 8 had had one, 7 two, and 6 three or more children. The age of the patients ranged from sixteen to twenty-eight years for the primiparas, and sixteen to thirty-six for the multiparas. In order to establish an index of the amount and frequency of pelvic and ureteral dilatations, and as a basis for judging postpartum changes, the first films were made during late pregnancy, and repeated exposures, usually three or four, were obtained during the ten to four-

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teen days following delivery. Stereoroentgenograms were taken in all cases to avoid the objection that a single film, if taken during a peristaltic contraction, might not represent the true size of the ureter. Obviously the antepartum pictures were uniformly better than those taken postpartum because of the marked urinary stasis present during late gestation.

ANTEPARTUM RESULTS

Seventy-five per cent of the antepartum plates were taken less than thirty days before delivery, although the range was from one to sixty-

TABLE I. SHOWING DEGREE OF DILATATION FOR PRIMIPARAS
(Number of Cases, 20)

DILATATION	CALYX				PELVIS				URETER			
	RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Marked	14	70	4	20	10	50	2	10	9	45	2	10
Moderate	5	25	6	30	9	45	8	40	7	35	10	50
Slight	1	05	7	35	1	05	10	50	4	20	6	30
None	0	00	3	15	0	00	0	00	0	00	2	10
Dilatation all grades	20	100	17	85	20	100	20	100	20	100	18	90

TABLE II. SHOWING DEGREE OF DILATATION FOR MULTIPARAS
(Number of Cases, 21)

DILATATION	CALYX				PELVIS				URETER			
	RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
Marked	11	52	2	09.5	9	43	2	09.5	10	48	2	09.5
Moderate	9	43	10	48	11	52	11	52	6	28.5	12	57
Slight	1	05	3	14	1	05	4	19	5	24	6	28.5
None	0	00	5	24	0	00	3	14	0	00	1	05
Dilatation all grades	21	100	15	71	21	100	17	81	21	100	20	95

TABLE III. SHOWING COMPARISON BETWEEN PRIMIPARAS AND MULTIPARAS
(Given in Percentage)

	RIGHT						LEFT					
	CALYX		PELVIS		URETER		CALYX		PELVIS		URETER	
	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.
Marked	70	52	50	43	45	48	20	09.5	10	09.5	10	09.5
Moderate	25	43	45	52	35	28	30	48	40	52	50	57
Slight	05	05	05	05	20	24	35	14	50	19	30	28.5
None	00	00	00	00	00	00	15	24	00	14	10	05
Not readable								05		05		
All grades	100	100	100	100	100	100	85	71	100	81	90	95

five days before the onset of labor. In general only one antepartum reading was taken, but in five cases a second exposure was made to obtain a better film. Each roentgenogram was read independently and the readings coincided except for occasional slight differences in expressing the degree of dilatation. Tables I, II, and III indicate that in all primiparas and multiparas there is some degree of dilatation of the right side while on the left side the percentage of patients showing dilatation is high. These figures are in accord with the findings of Duncan and Seng,[4] except that we find a larger number of left sided dilatations.

POSTPARTUM INVOLUTION OF THE URINARY TRACT

The authors just quoted found that involution takes place within nine to twenty-five days in a minority of the cases although the majority had not completed involution at the time of the cystoscopy. In two instances dilatation persisted for twenty-one months and nine years respectively.

TABLE IV. COMPARISON OF DEGREE OF DILATATION ANTEPARTUM AND ONE DAY POSTPARTUM

CASE NUMBER	CALYX				PELVIS				URETER			
	RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
	AP	PP	AP	PP	AP	PP	AP	PP	AP	PP	AP	PP
1	2	0	0	2	2	1	1	2	1	0	0	0
2*	2	0	0	0	2	1	1	1	1	2	2	2
12	3	2	2	2	2	2	2	1	2	2	1	1
20	3	0	0	0	3	1	1	1	1	0	0	1
21	3	3	1	0	3	x	2	1	3	x	2	0
25	3	3	3	1	2	2	3	0	2	3	3	1
29*	1	0	1	1	1	0	1	1	1	1	1	1
31	3	1	2	0	2	2	2	1	3	1	2	2

3, severe dilatation; 2, moderate dilatation; 1, slight dilatation; 0, no dilatation; x, unable to read; *, febrile cases.

We were impressed by the rapidity with which involution took place immediately following delivery in eight patients whom we happened to study one day postpartum. Except for Cases 2 and 29 with febrile reactions during the puerperium, there was a marked reduction in the extent of the dilatation within twenty-four hours. In these eight patients the right calices showed definite reduction in 75 per cent, the left calices in 38 per cent, the right pelvis and left pelvis each in 50 per cent, the

TABLE V. SHOWING PERCENTAGES OF RETURN TO NORMAL IN 17 CASES IN WHICH READINGS WERE TAKEN 9, 10, OR 11 DAYS POSTPARTUM

(Number of cases, 17)

CALYX				PELVIS				URETER			
NUMBER		PER CENT		NUMBER		PER CENT		NUMBER		PER CENT	
R	L	R	L	R	L	R	L	R	L	R	L
11	8	65	47	7	7	41	41	10	11	59	65

right ureter in 38 per cent, the left ureter in 25 per cent. Complete involution was observed in the calices in 50 per cent of the cases, in the pelves in 12.5 per cent, and in the ureters in 35 per cent.

Table V shows percentages of return to normal in 17 patients who were studied nine, ten, or eleven days postpartum. It will be seen that the pelves were considerably slower in their involution than were either

TABLE V-A. THE SAME TABLE WHEN FIVE PATIENTS HAVING INFECTION, OR URETERAL ANOMALY, WERE REMOVED FROM THE GROUP

(Number of cases, 12)

CALYX				PELVIS				URETER			
NUMBER		PER CENT		NUMBER		PER CENT		NUMBER		PER CENT	
R	L	R	L	R	L	R	L	R	L	R	L
10	7	92	67	7	7	58	58	10	10	83	91

the calices or the ureters. This group, however, included 5 patients who might be considered abnormal because of infection or ureteral anomaly. Table V-A shows how much more uniform the return to normal becomes when these 5 patients are excluded.

TABLE VI. ALL CASES, SHOWING NUMBER AND PERCENTAGE WHICH SHOWED SOME REDUCTION AT FINAL READING

(Number of cases, 41)

CALYX				PELVIS				URETER			
RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
38	93	25	61	37	90	28	68	32	78	31	76

TABLE VI-A. THE SAME TABLE WHEN CASES HAVING NO ANTEPARTUM OR POSTPARTUM DILATATION AND THOSE WHERE READINGS COULD NOT BE MADE WERE ELIMINATED

CALYX				PELVIS				URETER			
RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
38	95	25	100	37	93	28	85	32	82	31	83

From Table VI, it appears that at the time of the final reading (six to sixteen days postpartum) all dilatation had disappeared in a considerable percentage of the cases. Exclusion of those patients in whom there was no antepartum distention, and of those with unsatisfactory final films, increases the incidence of complete involution. (Table VI-A.)

Our results offer no conclusive evidence as to relative rapidity of involution in primiparas and multiparas, but wherever there is an appreciable difference, it favors the latter. Before, or at the end of the

twelfth day postpartum, there was a slightly higher percentage of primiparas than multiparas showing some residual dilatation of the urinary tract. And, except for the left pelvis, the primiparas presented a higher percentage of marked dilatation than did the multiparas at this stage of the puerperium. This quite agrees with the demonstration that extreme antepartum dilatation is more common among primiparous patients than in the parous. However, it is possible that the apparent tardiness in primiparas was due to the fact that the degree of dilatation had been more marked originally. With this possibility in mind, all patients who had shown marked antepartum dilatation were studied again. The left side was ignored because of the small size of the group. Twelve primiparas and 10 multiparas showed marked antepartum dilatation of the right calices while eight of each group showed similar dilatation in

TABLE VII. SHOWING DEGREES OF DILATATION OBSERVED IN PRIMIPARAS AND MULTIPARAS AT OR BEFORE THE END OF THE PUERPERIUM
(Given in Percentage)
(Number of Cases, 16 Primiparas; 19 Multiparas)

	CALYX				PELVIS				URETER			
	RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.	PRIM.	MULT.
Moderate	25	10.5	00	05	25	10.5	06	21	25	16	12.5	05
Slight	19	26	31	21	44	42	44	26	25	31	19	16
None	56	58	50	68	31	42	44	48	50	48	62.5	79
Not readable	00	05	19	05	00	05	06	05	00	05	06	00
All grades	44	37	31	26	69	53	50	48	56	37	31	16

TABLE VII-A. COMPARISON OF DEGREE OF DILATATION BETWEEN PRIMIPARAS AND MULTIPARAS AT END OF PUERPERIUM IN CASES WHICH SHOWED MARKED ANTEPARTUM DILATATION

	RIGHT CALYX				RIGHT PELVIS				RIGHT URETER			
	NUMBER		PER CENT		NUMBER		PER CENT		NUMBER		PER CENT	
Number of cases	12	10			8	8			8	8		
Dilatation shown by last plate	Prim.	Mult.	Prim.	Mult.	Prim.	Mult.	Prim.	Mult.	Prim.	Mult.	Prim.	Mult.
Moderate	3	2	25	20	3	3	37.5	37.5	3	4	37.5	50
Slight	3	3	25	30	5	3	62.5	37.5	4	2	50	25
All grades			50	50			100	75			87.5	75

the pelves and ureters. Table VII-A compares these groups. Again there is a suggestion that the primiparas exhibited a slightly greater tardiness in return to normal. However, further work is necessary to substantiate these tentative findings. (It should be noted that there

Fig. 1.—Para v, seventeen days antepartum.

Fig. 2.—Three days postpartum. Another plate taken six days postpartum showed essentially the same picture.

These plates show the typical course of involution in normal patients.

are no marked dilatations postpartum in these groups, for all of these patients had some degree of involution.)

INVOLUTION IN THE PRESENCE OF INFECTION

Five of the patients in the series had chronic gonorrhea, and it is interesting to note that involution was noticeably slower in this group. Five other patients had a definite low grade postpartum intrauterine infection. Two of these infections followed operative labors, cesarean sec-

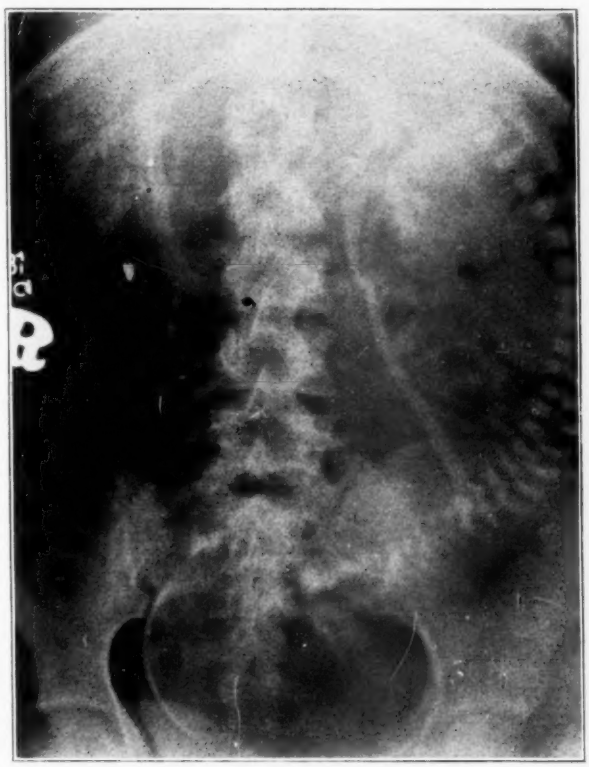

Fig. 3.—Primipara, twelve days antepartum. Note dilatation of ureters and kidney pelves.

tion, and low forceps, and three developed after spontaneous labor, one of which lasted forty-seven hours and thirty-four minutes.

This last patient was an eighteen-year-old primipara with normal pelvis and a normal baby lying in L.O.A. The antepartum plate (Fig. 3) was taken twelve days prior to the onset of labor, which was spontaneous following medical induction. Although the first stage was prolonged, the second stage lasted but one hour and thirty-two minutes. The temperature rose slightly on the third postpartum day and went above 100.4° F. on the fourth and fifth days. At this time the patient complained of pain in the left flank although a catheterized specimen of urine showed no pus cells. The next two pictures were taken (Fig. 4) one day postpartum when the patient was afebrile and on the morning of the fourth day (Fig. 5) when she was outspokenly febrile.

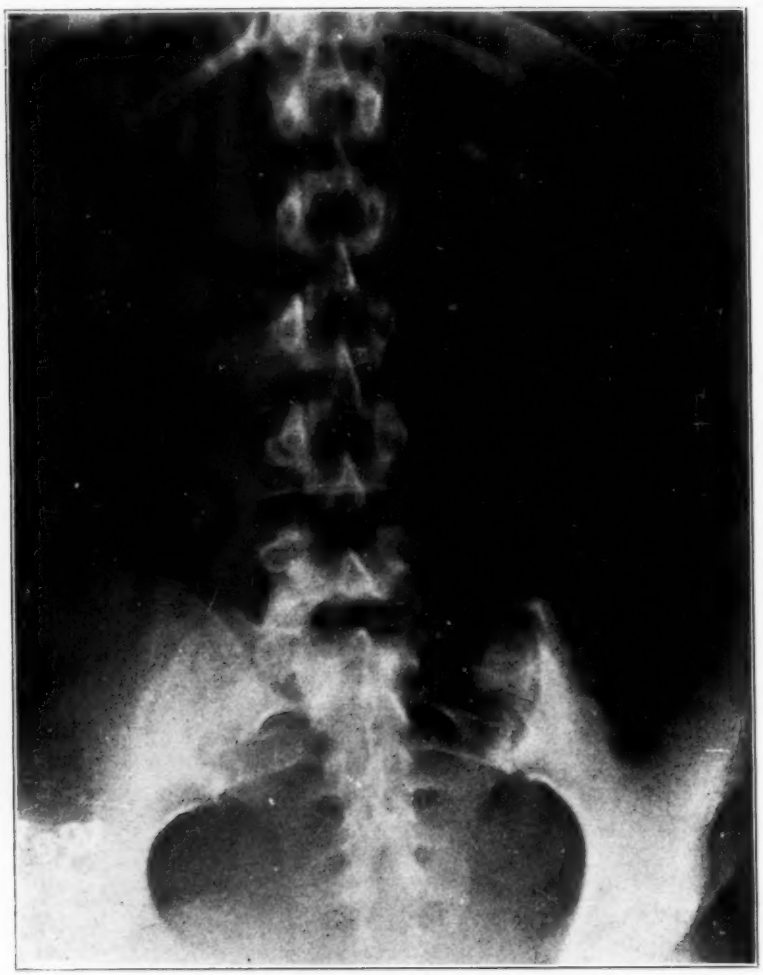

Fig. 4.—One day postpartum, afebrile. Compare dilatation of ureters and pelves as shown in Fig. 3. Note marked decrease in size.

This series of pictures is typical of the findings in the other four febrile patients. Tables VIII and VIII-A give a composite picture of the tardiness with which the involution of the urinary tract progressed in

TABLE VIII. SHOWING PERCENTAGES OF RETURN TO NORMAL IN PATIENTS WITH DEFINITE POSTPARTUM INFECTION

(Number of Cases, 5)

CALYX				PELVIS				URETER			
NUMBER		PER CENT		NUMBER		PER CENT		NUMBER		PER CENT	
R	L	R	L	R	L	R	L	R	L	R	L
2	1	40	20	1	1	20	20	1	0	20	00.0

TABLE VIII-A. SHOWING PERCENTAGES OF INFECTED CASES WHICH SHOWED SOME REDUCTION AT FINAL READING

(Number of Cases, 5)

CALYX				PELVIS				URETER			
RIGHT		LEFT		RIGHT		LEFT		RIGHT		LEFT	
NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%
4	80	2	40	4	80	1	20	2	40	0	00.0

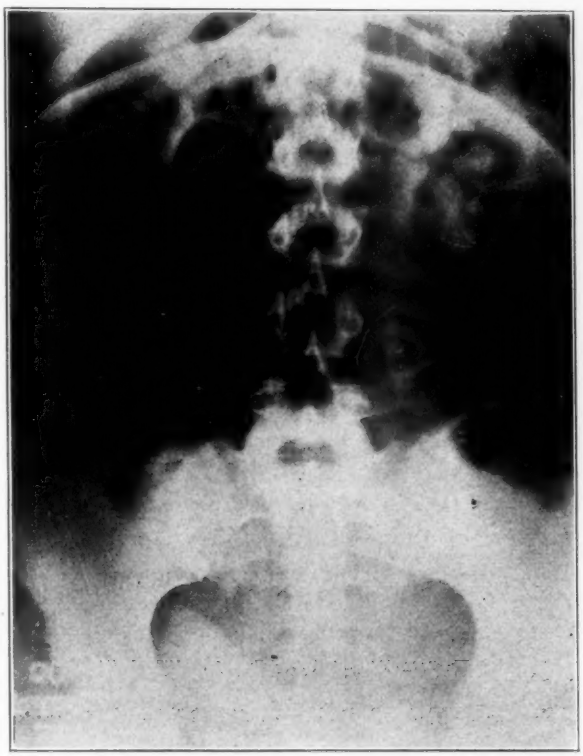

Fig. 5.—Four days postpartum, febrile. Compare size of left ureter and kidney pelvis with Figs. 3 and 4.

this group of infected patients. The contrast with Tables VI and VI-A is very striking.

DISCUSSION OF OBSERVATIONS ON INFECTED PATIENTS

We realize that this series of patients with puerperal infection is entirely too small to justify any conclusions, but the results are so outstanding that we feel inclined to postulate an hypothesis concerning the etiology of postpartum pyelitis.

It is well established that dilatation of the ureter is a primary factor in the production of pyelitis of pregnancy. Saitz[12] states that there must be a primary ureteral dilatation before pyelitis may develop; in-

fection is always secondary, and he says, "Repeatedly there may be dilatation with subsequent infection, but never infection without dilatation." Morris and Langlois,[11] Hofbauer,[10] Duncan and Seng,[4] and others, concur in this belief.

Why may not the same thing be true for pyelitis occurring during the puerperium? If intrauterine infection, even of a degree so mild as almost to escape recognition may cause dilatation of the ureter during the puerperium, it is reasonable to postulate that all patients so affected are possible candidates for postpartum pyelitis. In this small series of 5 patients with puerperal infection, the ureter remained dilated in 3, and redilated after a reduction in size in the other 2. It must be emphasized that none of this group with dilated ureters developed clinical symptoms of postpartum pyelitis, though 2 of the patients had transient costolumbar pain. Because of the findings in this group of 5 patients, we are tempted to believe that the primary factor in the production of a pyelitis, dilatation, is produced in some manner by an intrauterine infection developing during the puerperium.

Two cases of fatal puerperal infection seen in consultation during the past year are significant in this connection. In each instance the initial symptom was pain in the right flank which overshadowed the uterine findings. Despite the fact that the urine was practically negative, each patient was thought at the first visit to have postpartum pyelitis, and it was not until the other symptoms became more pronounced that the serious nature of the infection was discovered.

This conception of the etiology of postpartum pyelitis is purely an hypothesis suggested by the findings developing out of an investigation undertaken for the study of urinary tract involution in normal puerperal women. Because of the insufficient number of cases it is impossible to make any definite statement. The suggestions offered above partake of the nature of a preliminary report.

CONCLUSIONS

1. Each of the 41 patients showed some degree of dilatation of the right urinary tract prior to delivery, while the majority also showed dilatation on the left side.

2. More primiparas than multiparas had marked dilatation antepartum, and were more tardy in involuting postpartum.

3. A considerable decrease in urinary tract caliber was observed within twenty-four hours following delivery in 8 cases.

4. Of 12 normal patients, involution was complete in the majority by the ninth to the eleventh day.

5. The majority of 41 patients showed marked reduction in the caliber of the urinary tract by the end of the twelfth day postpartum.

6. Five patients having febrile puerperiums presented sluggish involution, and it is postulated that this delay may be the primary factor underlying the development of postpartum pyelitis.

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ACUTE ANTERIOR POLIOMYELITIS COMPLICATING PREGNANCY*

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ACUTE anterior poliomyelitis, apparently unknown as a definite disease entity prior to Underwood's[1] paper in 1784, has assumed a more and more prominent position in medicine during the past third of a century. Although much has been written concerning this disease, there are only a few scattered articles pertaining to the relationship of acute anterior poliomyelitis to pregnancy and to its occurrence during pregnancy. There are several possible explanations for the lack of literature dealing with the latter subject.

Acute anterior poliomyelitis is primarily a disease of childhood. In Vermont from 1912 to 1925 there were 848 cases of poliomyelitis, of which 176 or 23.5 per cent were over fifteen years of age. In Massachusetts from 1914 to 1923 there were 1594 cases reported, and only 145 or 9.09 per cent were over fifteen years of age. According to Wickman[3] and others the disease is slightly more common in males than females. Aycock[2] in a study of the age incidence of the disease concluded that "the majority of persons become immunized either subclinically or through unrecognized attacks of the disease" before they reach adult age.

Believing that an immunity to the virus of poliomyelitis in individuals who gave no history of having passed through an attack of the disease might be present, Aycock and Kramer[4] tested 75 normal individuals in Massachusetts and Vermont. Forty-six of the individuals were from urban communities and 29 were from rural districts. Of the urban population 69.6 per cent were immune by the neutralization test and only 20.7 per cent of the rural population were immune. In the age group fifteen to nineteen years, 85.7 per cent of the urban population and 50 per cent of the rural population were immune. In the adult group, 87.5 per cent of the urban and 40 per cent of the rural population were immune. The authors concluded that there is a wide spread immunity to poliomyelitis among individuals not known to have had the disease, and believe that this immunity originates in exposure to the virus, and from the extent to which it occurs and the order in which it develops that the virus spreads by person to person contact, the actual disease occurring in only a small portion of those exposed.

*Note: For lack of space, the complete paper of Dr. McGoogan cannot be included in the Journal but may be had in the author's reprints.

That the immunity to poliomyelitis is equally extensive in warmer and cooler climates is shown in that the serum of 18 out of 21 normal adults in Georgia neutralized the virus.[5]

From these studies it must be concluded that the occurrence of the disease in women during pregnancy must be rare. If the rare occurrence is not recognized, or if recognized is not reported in the medical literature then the disease becomes, on paper, relatively more rare.

Alpers[6] in an extensive study of the cerebral and spinal complications occurring during pregnancy states that poliomyelitis complicating pregnancy is of rare occurrence.

Three cases of acute anterior poliomyelitis during pregnancy have been observed in Omaha, Nebraska, during the past five years. This led to a survey of the literature upon the subject and five similar cases were found.

The first case reported is that of Schell's[7] in 1906. Although he diagnosed the case as one of myelitis, a review of the history warrants the reclassification to that of acute anterior poliomyelitis.

Renault and Martingay[8] reported the second case in 1911.

Miller[9] in 1924 reported two more cases.

Foulkrod[10] in 1924 reported a case as probably poliomyelitis, but after a careful review of the case history, it should be classified as an acute infectious myelitis rather than a poliomyelitis.

Hornung and Creutzfeldt[11, 12] reported the fifth case in 1930.

The three cases occurring in Omaha follow, and the first two are from the private service of Charles W. Pollard.

CASE 1.—Mrs. J. The patient was a primipara aged twenty-four, who had her last menstrual period May 10, 1926. She was well except for mild morning nausea until August 23 when she developed rather severe nausea. The following day she felt faint and tired. On August 25 she developed tenderness in the back, pain on motion in the back and legs and was unable to stand. There was moderate vomiting and severe headache. These symptoms persisted for four days after which time the patient developed urinary retention and paralysis of the right leg. The urinary paralysis lasted only two days. The pain in the back and legs persisted for three weeks then began to abate and the paralysis began to improve. She was admitted to the Omaha Maternity on September 6, 1926, two weeks after onset of her disease, and an examination at that time revealed absence of the right abdominal reflex, weakness of the right leg and a bilateral Kernig sign. A lumbar puncture was done, the pressure being 4 mm. mercury. The protein content was 25 mg. per 2 c.c. of spinal fluid, and a cell count showed 14 cells per c. mm. A spinal fluid Wassermann was negative and a colloided gold curve was not remarkable.

The patient improved with massage to the right and left legs and after two months was walking without support. She went into labor on February 3, 1927, and after a normal labor delivered a male child weighing 6 pounds and 12 ounces. The placenta was expelled normally. The puerperium was normal. The child was apparently normal and is well at the present time. The patient has had one normal pregnancy since.

CASE 2.—Mrs. N. The patient was a para ii, aged thirty-two, who had her last menstrual period on May 14, 1930. She was well except for slight morning nausea and vomiting until August 24, 1930, when she developed a generalized muscle sore-

ness in back and legs as if she had influenza, and she became very drowsy. She felt well for the next two days when she had a recurrence of the symptoms. The following day she felt so ill that she was confined to her bed and developed chills, fever, and epigastric pain with nausea and vomiting. These symptoms continued for seventy-two hours. One week after the onset of her illness she developed shooting pains in both legs and back. The nausea, vomiting, and epigastric distress ceased and the temperature became normal. Toward evening of that day her left leg became so "tired" that she could not move it. The following morning she felt so well that she got out of bed and while making her toilet she collapsed and found that she could not arise. The following day she noticed that she could not arise from a sitting posture or sit down, but if she were helped up she could walk by holding onto a chair, pushing it before her.

She was admitted to the Bishop Clarkson Hospital on that day, and an examination by Dr. Robert Shrock showed weakness of the abdominal muscles, more on the left than on the right, bilateral weakness of the hip muscles, no complete paralysis of the legs although the thigh muscles were the weakest. Dr. Shrock concurred in the diagnosis of acute anterior poliomyelitis, involving the last four dorsal segments of the cord. The patient was treated by massage and exercise and after three months had returned to two-thirds of her normal muscular power of the muscle groups involved.

The pregnancy continued uneventfully until January 5, 1931, when the patient developed a rise in blood pressure to 140/90, with three-plus albuminuria and slight edema of the extremities and face. She was treated at the Omaha Maternity Hospital from January 18 to 22 for toxemia, and was greatly improved on her discharge. She had a return of symptoms however, and was readmitted to the Hospital February 6 with blood pressure 150/90, albuminuria 2-plus, slight edema of face and hands and slight headache. She again improved under toxemia treatment and on February 10 was awakened at 2 A. M. by mild lower abdominal pains. She delivered herself at 5:30 A.M. of a normal female child weighing 6 pounds. The placenta was expelled normally and there was little bleeding. The puerperium was uneventful. Six weeks following delivery the patient had recovered 90 per cent of the function and power of her involved muscles. The child was well and showed no deformities.

CASE 3.—This case is reported through the kindness of Dr. Frank J. Munk. The patient was a primipara, aged twenty-four, and in the third month of gestation. On April 28, 1926, she developed pains in lower abdomen, pain and soreness in the back, both legs, and the right arm. There was an associated intense headache, and the temperature was 102°. The patient became paralyzed in both legs and the right arm the day after onset and developed urinary retention and constipation. There was no impairment of sensation. A lumbar puncture showed a slight increase in pressure, but otherwise normal findings. On April 30, May 1, and May 2 the patient was given Rosenau's serum intraspinally. She required catheterization of the bladder during this time. The temperature gradually subsided and on May 7 was normal. At this time the patient began showing some recovery of motion in the right arm and return of bladder function, and of bowel function.

She was treated with massage and plaster splints to her legs with slight improvement.

On September 21, the patient went into normal labor, and delivered a premature (eight months) child, weighing 5 pounds. The child lived only two days, the cause of death is unknown but was thought to be prematurity. An autopsy was not done.

The mother has regained very little function of her lower extremities, and is able to get about only with the aid of supports. She has not been pregnant since.

The mode of infection in this case is interesting. Living in the patient's home was a graduate nurse who was nursing a case of acute poliomyelitis.

EFFECT OF THE DISEASE UPON PREGNANCY

Any disease arising as a complication during pregnancy may affect the pregnancy. In the eight cases reported, the pregnancy itself was in no way affected. In the seven cases in which the disease occurred during the early months of gestation, there was no spontaneous interruption of the pregnancy nor was there intrauterine death of the child during the acute stage of the infection itself. What the ultimate effects in Miller's second case would have been are problematical, and undoubtedly Hornung's patient would have died undelivered had there not been the intervening cesarean section. One case (Munk's) delivered prematurely but five months after the onset and subsidence of the acute stage, and in view of the frequent occurrence of premature labor, it is doubtful if there was any relationship between the premature labor and the poliomyelitis. Although the series is small, it may be concluded that acute poliomyelitis occurring during pregnancy has no effect upon the pregnancy itself.

Pregnancy upon the other hand may be a factor in the severity and ultimate outcome of any disease already existing at the onset of gestation or occurring as an intercurrent infection. In only two cases out of the entire series, Miller's second case and Hornung's case, does pregnancy seem to have any deleterious effect upon the progress of the disease or its outcome. In Miller's second case, the patient was greatly improved following the interruption of the pregnancy. The patient had a paralysis of the bladder with a fulminating type of cystitis. The enlarged uterus evidently prevented a return of the normal tonus of the bladder, and a cystitis intervened as so frequently happens in those cases in which retention of urine, secondary to lesions in the spinal cord, occurs in paralytic bladders. Her long continued cystitis was undoubtedly the cause of her poor physical condition. Interruption of the pregnancy with resultant improvement of the patient's condition followed. In the remainder of the cases, although bladder paralysis was present, it was of short duration.

In Hornung's case the importance of the relationship of the extent of the paralysis to the duration of the pregnancy is clearly demonstrated. The patient developed an ascending paralysis involving the diaphragm with an increasing cyanosis. The aeration of the lungs in a normal pregnant woman at term is accomplished by a costal type of respiration rather than abdominal due to the restricted excursion of the diaphragm[13] and with emptying of the uterus, the chest is relieved. If the diaphragm becomes paralyzed then respiration is accomplished entirely by the accessory muscles. In an effort to obtain better aeration of the lungs already embarrassed by diaphragmatic paralysis, Hornung performed a cesarean section. The patient's condition appeared to have been temporarily improved as a result of this procedure in as much as she was not cyanotic. The disease was progressive and

the patient died. With an acute ascending paralysis in which there is involvement of the phrenic nerves, either partial or complete, it seems that emptying of the uterus should be done if the enlargement of the uterus is sufficient to encroach upon the diaphragm. This should be done not so much as an effort to check the progress of the disease but to improve the patient's lung aeration and postpone the onset of fatal respiratory paralysis. This procedure coupled with the use of a Drinker respirator[14] might give a favorable outcome to an otherwise hopeless case.

Cesarean section in this type of case might be considered as being entirely too radical a procedure. Another possible line of treatment that might be suggested would be the use of the Drinker apparatus combined with general supportive measures. If these failed then a postmortem cesarean section should be considered.

* * * *

That pregnancy may have some effect upon the rapidity of the process of recovery is possible but is not conclusively demonstrated in the cases reported.

In Case 2 of the Omaha series the improvement was slightly more rapid following delivery. In Case 3 there was no further improvement following delivery, and a similar condition occurred in Miller's first case. It is possible therefore to suggest that in the first instance the added strain of pregnancy retarded complete recovery before term, but after delivery, the load being removed, the regeneration progressed more rapidly. In the other instances no improvement followed delivery but perhaps the disease would not have been as extensive if pregnancy had not been present.

Fernandez[24] cites the case of a patient who became pregnant two months after the onset of her disease, and whose improvement following delivery by cesarean section at term was quite marked.

From the history of these cases there comes a suggestion that possibly pregnancy has some influence upon the rapidity of recovery from the effects of the poliomyelitis.

EFFECT OF THE DISEASE UPON THE CHILD

The transmission of disease from mother to child in utero can occur. Of the diseases involving the central nervous system, it has been shown that epidemic encephalitis sometimes may infect a fetus if the mother has the disease (Mercier[25]), (Marinesco[26]), (Jorge[27]), (Levaditi[28]), and that encephalitis in utero may be acquired from other causes (Paterson and Carmichael[29] and Virchow[30]). Kramer and Wright[31] reported the case of a woman with cerebrospinal meningitis who died before delivery but the autopsy revealed a similar condition in the child. Acute anterior poliomyelitis is an acute infectious disease, and the possibility of fetal involvement becomes apparent. By what route the virus reaches the

nervous system from the nasopharynx has not been definitely determined. The two possible routes are, (1) via blood stream, and (2) via the perineural lymph spaces of the olfactory nerve. Experimental demonstrations have supported the latter route (Draper[32]). If the latter route is the only route and the virus does not enter the blood stream, then it seems as if it would be anatomically impossible for the fetus in utero to develop acute anterior poliomyelitis.

The virus has not been found at any stage of the infection in the blood in human beings, though in the monkey, on the first day of symptoms it has been detected in one instance when large amounts of the virus were inoculated.[33] After intravenous injection of the virus into the blood, the virus tends to disappear so that after one hundred and twenty hours it is no longer present.[34] The finding of the virus in the lymph glands (Amoss[35]), (Levaditi[36]), supports the theory that the virus must be blood borne at some stage of the disease, possibly very early and its presence of very short duration. If the virus is blood borne at some stage of the infection before it localizes in the central nervous system, then it seems possible that it might be transmitted via placenta to a fetus in utero.

In only one of the eight cases reported is there any suggestion of intrauterine poliomyelitis and that is in Miller's first case in which the child was born with a bilateral club foot. Miller, however, points out that in view of the frequent occurrence of this deformity, it cannot be concluded that it is the result of a transmitted intrauterine poliomyelitis. One infant, delivered before the period of viability, was in no way deformed; and one was premature and died in forty-eight hours, yet it showed no external evidence of deformity. The other five children were perfectly formed.

* * * *

EFFECT OF THE DISEASE UPON LABOR

The effect of the paralysis and bony deformities subsequent to an attack of poliomyelitis upon labor depends upon a number of factors, (1) the extent of the paralysis, (2) the size and shape of the pelvis, (3) the size of the child and the relationship of the size of the head and the pelvis to one another, and (4) the general condition of the mother.

* * * *

Miller[9] discussed the possibility of prolonged bladder paralysis interfering with the second and third stages of labor. A full bladder might interfere with the normal contractions of the third stage and increase the possibility of a postpartum hemorrhage.

That the onset of uterine contractions occurs in spite of spinal cord lesions has been shown by many experiments and clinical cases. Normal delivery can and will occur with all the nerves to the uterus severed.

That the third stage may also be without incident is shown by Good's experiments.[53] He performed transection of the cord upon a pregnant guinea pig twenty-four hours before a cesarean section was done. Following the cesarean section the uterus contracted promptly without hemorrhage, and he concluded that the sympathetic nervous system and not the spinal cord controlled uterine contractions. Rudolph and Ivy[65] studied the uterine contractions in the postpartum uterus of the dog and came to the conclusion that there is an extrinsic and intrinsic mechanism, one resident in the uterine wall and the other in the uterovaginal ganglia, the former being the most important.

Very little difficulty should be expected with delivery in any of its stages, unless there is disproportion or malposition present, in a woman who has had poliomyelitis either preceding or during pregnancy. The six patients, who delivered via naturalis in the above reported series in which poliomyelitis occurred during pregnancy, delivered without difficulty, labor was not unduly prolonged, and the third stage was normal as to time and blood loss.

DIAGNOSIS OF ACUTE ANTERIOR POLIOMYELITIS

Luther and Aycock[66] in 1929 studied a large series of cases in order to determine the incubation period of the disease and from their studies concluded that the apparent incubation period falls within a period of from six to twenty days. They found evidence that "the infectious period of the disease may extend from the fourteenth day preceding the onset of symptoms to at least the fifth day of the disease."

Luther and Aycock[67, 68, 69] have given methods of making the diagnosis in the preparalytic stage. The patient is taken ill with fever, headache, and occasional gastrointestinal disturbances,nausea, vomiting, and constipation. Drowsiness and a desire to be let alone are frequently observed. These findings resemble most any acute infection and one should be on the watch for the following symptoms: flushed face, a rapid pulse, more prostration than the temperature warrants, and evidence of meningeal irritation, such as a coarse tremor, slight rigidity of the neck, stiffness of the spine, a very slight Kernig's, but with hyperactivity of the deep reflexes which later diminishes. A lumbar puncture with spinal fluid examination reveals the fluid to be under slightly increased pressure, an increase of white cells usually 50 to 250 per c.mm., increase of globulin and normal sugar, and the colloidal gold curve shows an early slight rise.[70] The patient may or may not develop a flaccid paralysis within the next forty-eight to seventy-two hours.

DIFFERENTIAL DIAGNOSIS OF ACUTE ANTERIOR POLIOMYELITIS

Acute anterior poliomyelitis may be confused with several other diseases which run a similar course or which show weakness or paralysis simulating that which occurs in poliomyelitis. A careful history and physical examination with study of the reflexes and sensory changes, accompanied by spinal fluid studies, will aid in making the correct diagnosis. Many of the acute infections in their early stages simulate the

early stage of poliomyelitis before the onset of the paralysis. One of the common diseases so confused in influenza, which the patient, reported as Case 2 of the Omaha series, thought she had before the onset of her paralysis. Renault and Martingay's patient had a similar condition. Acute articular rheumatism and typhoid fever are also commonly confused with poliomyelitis. Epidemic encephalitis with its prodromal symptoms of fatigue, headache and myalgia may so closely resemble poliomyelitis as to make the differential diagnosis difficult. However, encephalitis is primarily a disease of the higher nervous centers, and poliomyelitis a disease of the spinal cord. The presence of an epidemic aids in making the diagnosis.

Epidemic cerebrospinal meningitis may be confused with the encephalitic form of poliomyelitis as the symptoms of headache, vomiting, lassitude, fever and rigidity of the neck usher in both diseases. Spinal puncture and the finding of the meningococcus makes the diagnosis. The paralyses are different, as that of poliomyelitis is flaccid and of meningitis spastic.

An important differential lies between acute anterior poliomyelitis and the neuritides, the mononeuritis and the polyneuritis. In mononeuritis any nerve may be involved. Fink[71] reports a series of cases in which the nerves of the shoulder girdle, the facial nerve, the ulnar nerve, the median nerve, and the lumbar nerves respectively were the site of the disturbance.

* * * *

TREATMENT

Treatment of acute anterior poliomyelitis should be directed toward lessening the damage to the central nervous system. Early diagnosis and institution of therapy early are of great importance. The general opinion is that the use of human convalescent serum seems the most rational form of treatment, following the technic of Aycock, Luther, and Kramer.[81]

Rosenau had used antistreptococcic horse serum in 1,300 cases and reports favorable results. The best results are obtained with serum therapy in the preparalytic stage but it may be used with less favorable results in the early paralytic stage. After the paralysis appears, the diagnosis becomes quite apparent, and treatment should be directed toward the prevention of deformities and increasing the patient's general condition. MacAusland describes in great detail the treatment of this phase of the disease and what methods should be used to prevent the development of deformities.

The presence of a pregnancy, after reviewing the series of cases presented, in no way should alter the accepted forms of treatment for poliomyelitis. In the majority of cases when the disease occurs early during the gestation period, the pregnancy can be disregarded. If it

occurs late as in Hornung's case, or causes a cystitis as in Miller's case then interruption of pregnancy should be considered. Pregnancy following a recent poliomyelitis should be advised against, because of the possibility of the pregnancy affecting the rapidity of recovery as is suggested in Fernandez's case.

SUMMARY

1. Eight cases of acute anterior poliomyelitis complicating pregnancy are referred to, five from the literature and three additional cases.

2. Acute anterior poliomyelitis complicating pregnancy has no effect upon the pregnancy itself.

3. Pregnancy may have some effect upon the rapidity of the patient's recovery from the disease. It may increase the severity of the poliomyelitis, or its complications, such as, cystitis, and diaphragmatic paralysis.

4. Interruption of pregnancy should not be done except in those instances in which the uterus encroaches upon the diaphragm and there is diaphragmatic paralysis; or in the case of a severe cystitis, or other complications.

5. Intrauterine poliomyelitis if it does occur must be very rare.

6. Passive transmission of maternal immunity to the child does occur.

7. Very little difficulty should be expected with delivery in any of its stages, unless there is malposition or disproportion present in a woman who has had poliomyelitis either preceding or during her pregnancy.

8. Pregnancy following a recent poliomyelitis should be advised against.

Although eight cases is a small series from which to draw conclusions, much of interest has been learned from them. As more cases are reported, and there undoubtedly will be as the disease is apparently becoming more common, a better understanding of the pathology of acute anterior poliomyelitis and pregnancy will be reached.

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420 SOUTH TWENTY-FIFTH AVENUE.

Villarama and Galang: Typhoid Fever in Pregnancy. J. Philippine Islands Med. Assn. **10:** 311, 1930.

Sixty-four patients, consisting of pregnant and puerperal women affected with typhoid fever, formed the subject of these studies. Typhoid fever terminated pregnancy in about 78 per cent of the cases, but the termination of pregnancy did not in any way cut short the course of the disease.

Fetal mortality amounted to 60 per cent of the fetuses born. Maternal mortality was about 26 per cent, more deaths having occurred among patients affected during puerperium than among those affected during pregnancy.

Of the three cases with positive blood culture for Bacillus typhosus 2 recovered and 1 died. All the patients who had previously been inoculated with antityphoid vaccine recovered.

C. O. MALAND.

RADIUM THERAPY IN UTERINE HEMORRHAGES OF BENIGN ORIGIN*

A Clinical Study of 105 Consecutive Cases

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WHEN radium was first introduced as a therapeutic agent in gynecology it was employed entirely for the treatment of malignant neoplasms of the uterus, and it found its greatest field of usefulness in cancer of the uterine cervix. As this powerful agent became better understood, its curative properties were applied likewise to noncancerous or benign lesions of the uterus.

Radium therapy offers two important advantages: the first, the absence of primary mortality in properly selected cases and the second, the short period of hospitalization which its employment necessitates. The largest number of patients who need radiation for uterine hemorrhages are married women in middle life, nearing or at the menopause, who are very much needed at home because of growing children and the saving of time is an important consideration. We are all familiar with the severe uterine hemorrhages at the menopause, without gross macroscopic changes in the uterus and adnexa. Before the advent of radium, several curettages having failed, hysterectomy was resorted to. One, and sometimes two blood transfusions had to be administered to women so afflicted in order to get them in condition to stand an operation as extensive as the ablation of the uterus. Again, there were the worries of the first few postoperative days in many of these patients who, because of secondary anemia, were considered poor surgical risks. The period of convalescence following such an intervention was rarely less than four weeks. While many operators have been able to report series of one hundred or more hysterectomies without a fatality, it is an admitted fact that the mortality of this operation, in the hands of well trained surgeons, varies between 2 and 3 per cent for the subtotal and slightly higher for the total removal of the uterus. It is, of course, much higher in the hands of the occasional operator. Radium used for the same conditions should have no primary mortality, when properly employed, and if it does, it is strikingly less than that of hysterectomy. The period of hospitalization, about three days, in the case of radium, against an average of two weeks in the case of hysterectomy, is greatly in favor of the former.

In all benign lesions of the uterus, where the application of radium may be indicated, the principal symptom is hemorrhage. Radium, there-

*Read, by invitation, at a meeting of the New York Obstetrical Society, December 8, 1931.

fore, is of greatest value in small fibromyomas and in menorrhagia and metrorrhagia in uteri presenting no gross macroscopic lesions. Hypertrophy and hyperplasia of the endometrium fall into this group. Again, the patients having uterine hemorrhages may be placed in three classes according to their ages, (1) the hemorrhages of adolescence and of young women; (2) the hemorrhages of middle life, and (3) the hemorrhages of the menopause and those occurring after the menopause.

THE MAIN CONTRAINDICATIONS TO RADIUM THERAPY ARE LARGE FIBROMYOMAS, INFLAMMATION OF THE ADNEXA AND OVARIAN TUMORS

Insofar as fibromyomas are concerned, radium may be used as a curative agent in the smaller tumors or it may be used as a prophylactic

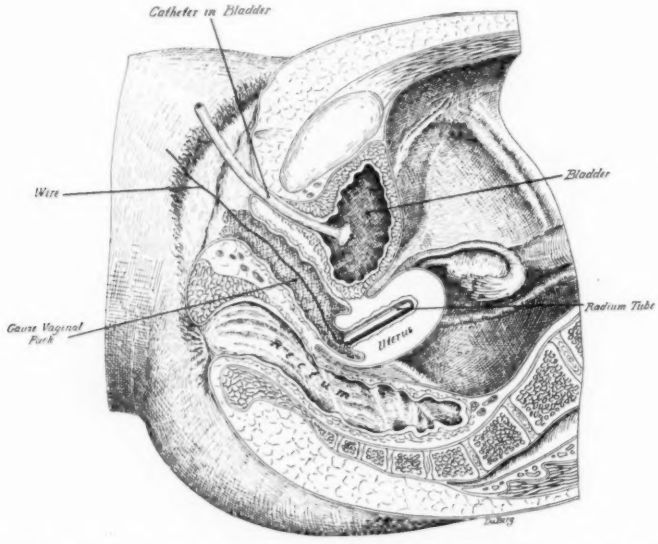

Fig. 1.—Sagittal section of the pelvis showing the radium tube in the uterus, the vaginal gauze pack, and the self-retaining catheter in the bladder.

agent to arrest hemorrhage from the larger tumors, thus permitting the patient to improve in general health and allowing the performance of a hysterectomy under safe conditions at a later date. Subserous fibromyomas, if pedunculated, are but little affected by radium. Moreover, radium causes necrosis and sloughing, thereby increasing the amount of bleeding in the submucous variety. The best results are obtained in the intramural or interstitial tumors. The age of the patient plays an important rôle in the treatment of these new growths. In young women myomectomy and conservation of the functions of menstruation and reproduction should be resorted to when possible. A fundic hysterectomy, saving enough endometrium to allow menstruation when it is impossible to save the function of reproduction, should be the next step in order. A subtotal hysterectomy, in the presence of a healthy cervix and a total hysterectomy when this organ is irritated or severely lacerated, together

with the conservation of one or both adnexa, should be performed when the tumors are voluminous or too numerous to allow the application of the first two mentioned procedures. After the menopause both tubes and ovaries should be removed with the uterus. In the younger women radium is employed only when there are definite constitutional contraindications to an operation. At the menopause radium may be chosen for the small tumors, those not exceeding a three-month pregnancy in size and for the poor surgical risks, while surgery may be selected when the opposite is true.

The successful use of radium in the treatment of benign lesions of the uterus rests upon the ability to perform a satisfactory bimanual examination to rule out adnexal infection and inflammation, together with ovarian neoplasms.

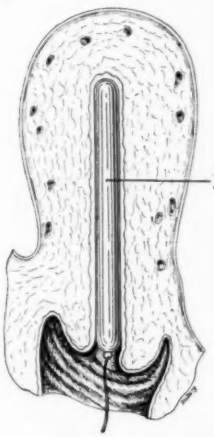

Fig. 2

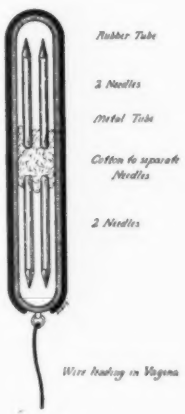

Fig. 3

Fig. 2.—The radium tube usually occupies the entire uterine cavity except in the case of fibromyomas, where it is placed as near the fundus as possible.

Fig. 3.—The radium applicator (diagrammatic). Four radium needles 0.0125 gm. each, are used, making a total of 0.050 gm. The filtration is through one millimeter of brass and one-half a millimeter of rubber, filtering the alpha and beta rays and delivering the gamma rays.

An examination of my personal records from September 27, 1927 to August 10, 1931 shows that I have treated 105 consecutive cases of uterine hemorrhage of benign origin with radium during this period of time.

These 105 cases are classified as follows:

Fibromyomas	15
Uterine hemorrhages of adolescence and of young women	7
Uterine hemorrhages of middle life	72
Uterine hemorrhages after the menopause	11
	105 Cases

TECHNIC OF APPLICATION

A laxative is given the day before and a soapsuds enema the evening previous to operation. The vulva and vagina are scrubbed with liquid green soap and irrigated with a solution of potassium mercuric iodide 1-1000. One of the methods of dry

preparation may be used if preferred. The cervix is exposed, its anterior lip grasped with a suitable vulsellum and in the presence of a cervical discharge, the cervical canal is swabbed with tincture of iodine 3½ per cent, applied on a cotton wound applicator. The cervix is gently dilated and the uterine cavity curetted. A diagnostic curettage, with histologic examination of the curettings, is performed in all cases to rule out malignancy. The radium applicator consists of a brass tube 5 cm. in length and 1 mm. in thickness, into which is disposed 50 mg. (0.050 gm.) of radium in the form of radium sulphate. The brass tube, at the end of which a fine nonrusting wire is attached, is covered by a thin rubber sac 0.5 mm. thick. The tube is placed in the uterine cavity and usually occupies its whole length except in the case of fibromyomas. This apparatus filters out the alpha and the beta rays and allows gamma radiation. The vagina is firmly packed with plain sterile gauze; medicated gauze, such as iodoform and xeroform, is never used in order to avoid secondary radiation. A self-retaining catheter is introduced in the bladder and the patient is returned to bed. During the period of radiation she stays quiet in bed, in dorsal decubitus, to prevent disturbing the apparatus. The radium is left in for a definite number of hours according to the dose which is necessary; thus, if the radium is left in thirty-six hours the dose would be 1800 mg. hours. She is placed on a liquid diet, including milk and morphine sulphate or pantopon, in appropriate doses, are prescribed when necessary for pain and insomnia. The patient may be allowed out of bed the day the radium is removed or the next day if she prefers. During the period of radiation there may be a certain amount of nausea; rarely is emesis present. Occasionally, there may be abdominal cramps caused by the presence of the radioactive tube. The smaller the tube used, the less likely is the presence of pain. These symptoms are generally over after the first twenty-four hours if the radium is left in for a longer period of time. If the radium is introduced shortly after a period the following menstruation may be missed. On the other hand, if it is applied just before an expected catamenia this may occur as a regular period. I have not seen more than two menstruations when a sterilizing dose was employed, except in one instance. The high temperature reactions spoken of by some authors have not been met in this series of cases. The highest thermic reaction encountered was 101° F. (38.3° C.). For about two months, rarely more, there is a moderate leucorrhea which is easily controlled by a daily douche. A satisfactory one is obtained by dissolving two teaspoonfuls of "antiseptic powder" (National Formulary) in two quarts of warm water.

When a sufficient dose of radium has been employed the symptoms of the menopause soon follow. These, as a rule, are not more severe than those of the physiologic menopause.

ANESTHESIA

In the series of 105 cases reported, local infiltration anesthesia was used 9 times, spinal anesthesia 4 times and nitrous oxide, oxygen, ether anesthesia 92 times. Local infiltration anesthesia gives such satisfactory results in this type of case that I feel it will largely replace the other two forms in my future cases. Its administration is simple, and it is the safest procedure to use, especially in women who have lost a great deal of blood. A one per cent solution of novocaine is employed. With a long, thin, flexible needle 5 c.c. are injected at the base of each broad ligament to block the sympathetic plexuses of Frankenhäuser, 5 c.c. are placed anteriorly at the level of the bladder reflection and the same amount posteriorly. After a few minutes, the cervix is insensitive and the dilatation may be begun. For spinal anesthesia, in these cases, I

have never used more than 100 mg. of sterile novocaine crystals. These are dissolved in 2 c.c. of spinal fluid and slowly reinjected.

STATISTICS

Fibromyomas Uteri, 15 cases.

The ages of the fifteen patients with fibromyoma uteri in this group were as follows: Thirty-six years; thirty-seven years, 3 patients; thirty-nine years, 2 patients; forty years; forty-one years; forty-two years, 2 patients; forty-four years; forty-seven years; forty-eight years; forty-nine years and fifty-three years.

In all cases the myomas were small. In eleven women a dose of 1800 mg. hours was administered; in two others a dose of 2400 mg. hours was given. In the case of a woman, thirty-six years old, who had a myoma the size of an orange, about 7.5 cm. in circumference, at the right uterine horn and who also had a mitral stenosis and regurgitation, a radium dose of 1400 mg. hours was used on December 2, 1926. This completely arrested the bleeding until December, 1927, when it recurred. Examination, then, revealed a myoma in the same region. A second dose of radium, consisting of 1800 mg. hours, was given, making the total dose 3200 mg. hours. This stopped the bleeding permanently and caused the tumor to disappear. A woman, forty-one years of age, having multiple small fibromyomas, was given 1400 mg. hours and subsequently 1800 mg. hours, making a total dose of 3200 mg. hours. This brought on permanent amenorrhea, but a hysterectomy, with the ablation of the adnexa, was later performed because of pelvic pain. The details of her case follow:

Mrs. —— Case No. 4947, aged forty-one, consulted me on November 4, 1927. She complained of menorrhagia and metrorrhagia, the periods lasting nine days with an interval of two weeks. She had been married fourteen years; she had two miscarriages between three and four months of pregnancy and one child at term, delivered instrumentally, who subsequently died.

The physical examination, except for secondary anemia and a few nabothian cysts of the cervix, was negative. A diagnostic curettage was performed on November 9, 1927. The histologic diagnosis was hyperplasia of the uterine mucosa. At this time radium was applied to the uterus, a dose of 1400 mg. hours being given. Following the radium application the patient started to flow on December 13, 1927 and flowed freely for five days, after which amenorrhea occurred until August 22, 1928 when the flow recurred and she began to pass large clots of blood. Drug therapy had no effect on this flowing. On October 13, 1928 a second dose of radium, consisting of 1800 mg. hours, was given, making the total dosage 3200 mg. hours. This brought on a permanent amenorrhea. The blood improved considerably so that it was within normal limits at this time. The patient, however, was complaining of pelvic pain, especially on the left. This pain was not relieved by local treatments. Her condition had so improved since her first visit that it was decided to do a hysterectomy in order to relieve her of the pain she constantly complained of.

On January 7, 1929 a blood transfusion, consisting of 600 c.c. of citrated blood, was administered. On January 8, 1929 a supravaginal hysterectomy, with coning of the cervix and removal of the adnexa, was performed. The convalescence was uneventful. The pathologic report was: "Multiple uterine myomas, hyperplasia of

the uterine mucosa, chronic cervicitis, localized fibrosis of the uterus, sclerotic ovaries.'' The fibroids were diffuse in the uterine wall and had not been felt on bimanual examination. The patient was discharged from the hospital in excellent condition and has remained well since.

In all fifteen cases a diagnostic curettage was performed prior to the radium application. Histologic examination of the curettings ruled out malignancy in all of them. In one of these women three large hemorrhoidal masses were removed under local anesthesia in addition to the radium application. In one other, whose blood examination showed severe secondary anemia, a transfusion of 600 c.c. of citrated blood was administered before the insertion of radium.

Uterine Hemorrhages of Adolescence and of Young Women, 7 Cases.—There were seven cases in this group. The ages were sixteen years in two, eighteen years in one, nineteen years in two, and twenty-four years in two. The complaint was menorrhagia in five and menorrhagia and metrorrhagia in the other two patients. The radium dosage was 400 mg. hours in two patients, in one of them a second dose of 500 mg. hours was given three months later, 500 mg. hours in two and 600 mg. hours in three.

Hemorrhage was arrested and regular periods established in five of these patients. In one of them a second dose of radium had to be given three months later, after which the excessive flowing at the periods ceased. In the case of a young woman, twenty-four years of age, a radium dose of 600 mg. hours had been successful in temporarily arresting the bleeding, but she is now flowing more than the normal at her periods. A second small dose of radium has been advised, but not given as yet. In the case of a single girl, nineteen years old, a 600 mg. hour dose had but little effect on the bleeding. A second dose was advised; this advice was not taken, however, and a hysterectomy was performed by another surgeon.

In all these cases medical and endocrine treatment had been tried without result before resorting to the use of radium.

UTERINE HEMORRHAGES OF MIDDLE LIFE, HYPERTROPHY AND HYPERPLASIA OF THE ENDOMETRIUM, 72 CASES

Ages

Between 29 and 35 years	6
Between 35 and 40 years	12
Between 40 and 45 years	24
Between 45 and 50 years	25
Between 50 and 55 years	5

Radium Dose

500 mg. hrs.	1	1650 mg. hrs.	1
1200 mg. hrs.	6	1700 mg. hrs.	2
1250 mg. hrs.	1	1725 mg. hrs.	2
1400 mg. hrs.	3	1800 mg. hrs.	50
1450 mg. hrs.	1	2250 mg. hrs.	1
1500 mg. hrs.	1	2400 mg. hrs.	3

Additional Operations in This Group

Bilateral trachelorrhaphy	5
Amputation of cervix	11
Biopsy of cervix	2
Cervical polypectomy	2
Puncture of nabothian cysts	1
Anterior colporrhaphy	2
Colpoperineorrhaphy	17
High vaginal fixation of uterus	1
Kelly operation for relaxed vesical sphincter	1
Reconstruction of right labium minus	1
Hemorrhoidectomy	1

In all seventy-two cases a diagnostic curettage was performed.

In the case of a woman fifty years old the following pathologic report was received: "Chronic inflammation with hypertrophied endometrium, epithelial cells atypical. The patient should be watched carefully." A radium dose of 1800 mg. hours was given on February 25, 1928. She has been well since.

UTERINE HEMORRHAGES AFTER THE MENOPAUSE, 11 CASES

AGE	DIAGNOSIS	RADIUM DOSE
52	Hypertension. Hyperplasia of endometrium. Previous amputation of cervix	1200 mg. hrs.
57	Hyperplasia of endometrium. Cervical polyp	1800 mg. hrs.
66	Hyperplasia of endometrium. Cervical polyp	1800 mg. hrs.
59	Hyperplasia of endometrium	1800 mg. hrs.
63	Hyperplasia of endometrium. Nabothian cysts	1200 mg. hrs.
60	Hyperplasia of endometrium. Previous interposition of uterus	1200 mg. hrs.
60	Atrophied uterus	1200 mg. hrs.
62	Atrophied uterus	1800 mg. hrs.
63	Atrophied uterus	1800 mg. hrs.
63	Atrophied uterus	1750 mg. hrs.
70	Ulceration of vaginal vault. Histologic examination showed no malignancy. Radium pack	600 mg. hrs.

One patient in the series had a hysterectomy at a later date because of recurrent hemorrhages following a radium dose of 1725 mg. hours. The bleeding had been temporarily arrested so that the operation could be performed safely because of her improved general condition. The history of her case follows:

Mrs. —— Case No. 4304, aged forty, was seen in consultation on March 3, 1927. She complained of flowing daily, although scantily, for a month and a half and of having a stain of blood following coitus. She had been married ten years; she had five children, one of whom had been delivered by vaginal cesarean section for eclampsia. On March 5, 1927 a trachelorrhaphy had been performed to repair old lacerations. On March 12, 1928 she had a dilatation and curettage and suture of the anterior lip of the cervix which had again become lacerated following delivery. The pathologic report showed chronic hyperplastic endometritis and polypoid hyperplasia. She was again seen on April 22, 1929; she had severe menorrhagia and secondary anemia, her hemoglobin being 50 per cent. On May 1, 1929 the bleeding had stopped and her condition was somewhat better. Under local anesthesia radium was introduced in the uterus and a dose of 1725 mg. hours administered. She reported

on February 18, 1930 and stated that she had started to flow again in December, 1929. She had then been bleeding for a month and had pain in the region of the left adnexa. She was sent to the hospital and on March 26, 1930 a supravaginal hysterectomy, double salpingo-oophorectomy, and appendectomy were performed. She was discharged well from the hospital. The pathologic report was as follows: "Microscopic examination of sections of the uterus show atrophic and essentially negative mucosa. The wall of the uterus is essentially negative except for hyalin thickening of the vessel walls, probably the result of involution changes. Sections of the ovary show many old corpus luteum scars and no evidence of active ovulation. Sections of the tubes show atrophy of the epithelium and simplification of the mucosal folds." On May 23, 1930 she reported for examination at which time it was found that the incision was well healed; the cervix was healed and well suspended and all vaults were clear. She was feeling well and has remained so.

In all cases, except in the case of the woman with ulceration of the vaginal vault, a diagnostic curettage was performed and the curettings examined histologically. In the four atrophied uteri but little endometrium was obtained. However, the radium stopped the bleeding in these four patients. The cervical polyps were resected and the nabothian cysts fulgurated. The ulcer of the vagina healed and the hemorrhage stopped in the six women with hyperplasia of the endometrium.

SUMMARY

One hundred and five women were treated with radium for uterine hemorrhages of benign origin. There was no mortality following this form of treatment in this series. Fifteen women having small fibromyomas, smaller than a two months' pregnancy, were treated. In 14 of them the tumors disappeared and permanent amenorrhea was established; in the fifteenth, although menstruation had completely stopped, a hysterectomy was performed at a later date for pelvic pain. In 7 cases of uterine hemorrhages of adolescence and of young women, where the smallest dose was 400 mg. hours and the largest dose 600 mg. hours, 4 were benefited with one dose, one was improved after a second dose, one needs another small dose, and the last had a hysterectomy performed by another surgeon when menorrhagia returned after a 600 mg. hour dose. In the group of uterine hemorrhages of middle life comprising 72 patients, one woman who had a dose of 500 mg. hours was improved and her menstruation continued. In 72 who had sterilizing doses 70 had permanent amenorrhea and were considered cured. In one of them hysterectomy was resorted to sometime after a 1725 mg. hour dose, for the return of the hemorrhages. Her physical condition had so improved during the period of amenorrhea produced by the radium, that the reaction from operation was slight and she made an uneventful recovery. I am sure the result would have been different had hysterectomy been attempted at the time she was subjected to radiation. In addition to the radiation there were 11 distinct types of operation performed on 44 women in this group. The 11 women having hemorrhages after the menopause saw cessation of the bleeding and were permanently improved. No pregnancies occurred in any of the women after radiation.

CONCLUSIONS

1. Radium employed in suitable doses, in properly selected cases, is a valuable agent in the treatment of uterine hemorrhages of benign origin.

2. It finds its greatest field of usefulness in women near or at the menopause, having severe hemorrhages from uteri showing no gross macroscopic lesions, as in hypertrophy and hyperplasia of the endometrium.

3. It should be used cautiously, to avoid hysterectomy, in the hemorrhages of adolescence, and only after medical, endocrinal and hemostatic treatment have failed. Here minute doses should be employed. I have never gone above 600 mg. hours in this type of case.

4. It should not be used to regulate the menstrual periods and in an attempt to favor pregnancy, because of the risk incurred by the product of conception.

5. It is of value in treating small fibromyomas of the interstitial type, especially in women nearing the menopause.

6. A single application, giving an appropriate dose, is sufficient to bring on permanent amenorrhea.

7. These cases may be successfully treated with a small amount of radium (0.050 gm.), and with a minimum amount of apparatus.

270 COMMONWEALTH AVENUE. *(For discussion, see page 283.)*

THE TOXEMIAS OF PREGNANCY WITH SPECIAL REFERENCE TO LIVER FUNCTION

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INTRODUCTION

THERE is no difficulty in making a differential diagnosis between a typical nephritic toxemia of pregnancy and eclampsia. Between these two extremes is a large number of cases not so amenable to classification. It is necessary only to note the many classifications which exist to realize how little is known of toxemias of pregnancy.

Only occasionally eclampsia is not recognized. Pregnancy complicated by nephritis is usually diagnosed. The vomiting toxemias are relatively easily differentiated. Beyond these types little is definitely known. The large number showing, early or late in pregnancy, hypertension, albuminuria, and various toxic symptoms, some of them eventually developing eclampsia, some responding to treatment, and some presenting evidence of lasting renal damage, comprise the greatest number and are by far the most confusing to classify.

The present study was undertaken hoping that a detailed and correlated clinical and biochemical study of a group of pregnancy toxemias

and control cases might help in this classification. More than any other phase of the work liver function was stressed. Especially was it desired to formulate some prognostic index, some means of determining the final outcome of patients when first they became toxic. The value of such a procedure, if it were possible to elaborate one, would be unequivocal.

A series of toxemias contrasted against a series of controls is here presented. The history of each patient was carefully taken, with especial reference to previous obstetric toxemia or entities which might predispose to toxemia. Physical examination including ophthalmologic examination by a competent eye man was done. Detailed facts regarding the labor, the baby and infarction of the placenta were noted. The postpartum period was observed in most cases for from one to six months. The laboratory work comprised frequent readings of the blood pressure by the same observer, and analyses of the blood and urine. Renal function tests were made according to the method of Mosenthal. Liver function was studied by means of the nitrogen partition in the blood, the icterus index, and van den Bergh tests, and by quantitative determinations of the urobilin in blood and urine. As particular importance has been given to the urobilin findings in this paper, the technic of its detection as well as a short summary of previous pertinent investigations with this substance will now be discussed.

Urobilin.—Urobilin is formed from the bile pigment bilirubin. It is believed that bilirubin is reduced by bacteria in the intestine to urobilinogen which is reabsorbed by the blood stream and there oxidized into urobilin. It reacts with a characteristic fluorescence to certain acetate compounds, a fact Elman and McMaster have utilized for a quantitative test which has been employed in this study.

In normal urine there is found not more than 3 mg. of urobilin per 100 c.c. of urine. This concentration is not usually exceeded in the urine of normal pregnancy. Urobilinuria, however, occurs in many pathologic conditions. To conclude that its presence indicated primary liver damage would not be accurate. For example, organic heart disease may give rise to urobilinuria. Edelman shows that the degree of cardiac decompensation may be measured by the quantity of urobilin found in the urine. In this series 3 out of 5 syphilitic patients had excessive urobilinuria, but in only 1 of these was toxemia present, the other 4 being controls. Any disease which breaks down the red blood corpuscles may cause the appearance of this pigment in the urine. It is believed, however, that liver damage and consequent dysfunction causes the urobilinuria. Finally, it has been shown by Warthin that the urobilin content of the urine varies greatly within twenty-four hours, so that analysis of the total daily output is advisable.

Much work has been done with urobilin in pregnancy. Walthard believes that it is found in normal pregnancy. Litzenberg found it in the urine of 25 per cent of pregnant women in a series of 200 cases, while it was absent in 71 nonpregnant

controls. He uses the phrase "liver of pregnancy." King tried to differentiate nephritic and hepatic toxemia by means of the presence or absence of urobilinuria, but was unsuccessful. Barnard studied the urine of 115 pregnant women. About 80 per cent showed urobilinuria at one time or another. She included no details, but speaks of these women as being apparently normal. Berkeley depended upon increased urobilinuria as a criterion for induction, and felt that was the best and perhaps the only safe test upon which to interrupt pregnancy for toxemia.

Some of this work presents evidence that urobilinuria is as apt to occur in normal as in toxemic pregnancy. This has not been our experience in this study. Two reasons may account for this: first, previous work has utilized the dilution method for the detection of urobilin, a method which is not accurate; second, this former work presents little of a clinical nature, and there is no evidence that it was adequately controlled. In the vast majority of nephritic patients and controls studied in this series urobilin was either absent or present in normal quantities. Sharply differentiated from these two classes were the results obtained in the other toxemias where urobilinuria was found in greater degree, and it was found consistently.

Certain studies were made on the quantitative determination of urobilin in the blood. No previous work in this field in pregnancy could be found in a careful review of the literature. Royer finds that the concentration of this substance in the urine varies as its concentration in the blood. Nothing is actually known of the renal threshold of urobilin. In this series there was no apparent relation between the concentration in the blood and urine.

Microscopic study of hepatic and renal tissue is not available during the treatment of pregnancy toxemia, and it is common experience that the differential diagnosis of the type of toxemia is difficult. If it were possible to employ a simple laboratory test to help make this diagnosis, another aid in treatment and prognosis might be afforded.

The cases, numbering 70, which form the basis of the present study were classified as follows: nephritic toxemia, preeclampsia, eclampsia, the vomiting toxemias, acute yellow atrophy of the liver.

Nephritic Toxemia.—Thirty-eight patients were of the nephritic type. Among the factors in making this diagnosis was a history of previous pregnancy toxemia, multiparity, continued hypertension or albuminuria during the puerperium, the relatively early onset of the toxemia, azotemia, and a grossly impaired renal function.

Preeclampsia.—This condition, of which 23 cases were encountered, is often difficult to diagnose. When a toxemia occurred, usually late in pregnancy, often in a primipara, accompanied by the well-known clinical symptoms and when it was believed that eclampsia would result if no treatment were given, and further, when the signs and symptoms returned to normal relatively early in the puerperium, then it was classified as preeclampsia.

Eclampsia.—The diagnosis presents little difficulty. It is necessary to rule out uremia, epilepsy, and other conditions with convulsive seizures.

Vomiting of Pregnancy.—In this series patients were noted as having pernicious

vomiting of pregnancy when, early in gestation, they continued to vomit on starvation diet, no other organic cause being demonstrable.

Acute Yellow Atrophy of the Liver.—Three patients with acute yellow atrophy of the liver were included. The first died, autopsy confirming the diagnosis. The second recovered, and has been reported by Rice. The third case was complicated by syphilis and the liver atrophy was due in part to arsenic.

DISCUSSION OF CLASSIFICATION

No subgroups were included. The hypertensive toxemia described by Corwin and Herrick frequently ends in kidney damage, and it was believed that clinically the secondary renal involvement was of greater import than the primary arterial disease.

Stander originated the classification used in this series but he included a group known as "low reserve kidney." Here a few such cases were placed in the nephritic category, as it was believed that there was a fundamental renal pathologic condition. Pregnancy has been called the most delicate test of renal function.

Obviously in such a small series as this there will be found borderline types, hard to fit exactly into any of the major classifications. Such cases were placed in the group in which they seemed best to belong clinically.

CONTROLS

These were carefully selected, the following qualifications being satisfied; first, at no time a systolic pressure of 130 mm. Hg or more; second, no albuminuria at any time; third, no toxic symptoms at any time. Control figures on urobilin, amino-acid nitrogen, icterus index were obtained from such selected cases simultaneously with the investigation of the toxemias. Control values for routine blood chemistry were taken from the well-established figures of Killian and Sherwin, Folin, Slemons and Morris, Caldwell and Lyle, Denis, and Harding.

GENERAL CONSIDERATIONS

A definite plan was adopted and each case was considered from nine points of view, the age and parity; the past history; physical examination; the period of gestation at which the toxemia began; antepartum course, including blood pressure, urinalysis, blood chemistry, and symptomatology; term, and the type of delivery; weight and condition of the baby; the placenta; the postpartum period. This paper is concerned chiefly with the first five points.

Age and Parity.—

Nephritis	28 plus years
Preeclampsia	27.5 years
Eclampsia	30.5 years
Vomiting	29.5 years
Atrophy	29.5 years

There is little shown here except that toxemias tend to occur in patients older than the average.

	PARA	GRAVIDA
Nephritis	2.55	2.5
Preeclampsia	1.33	1.33
Eclampsia	1.0	1.0
Vomiting	2.25	3.0
Atrophy	4.0	6.0

Multiparae constituted 53 per cent of the nephritic toxemia cases, but only 30 per cent of the others. In the nephritic group among 93 pregnancies there were 83 viable babies, while in the hepatic group 32 pregnancies resulted in 34 live babies.

The Past History.—The following conditions were considered significant in the past history: scarlet fever, diphtheria, repeated tonsillitis, rheumatic fever, kidney disease, very bad teeth, syphilis, previous pregnancy toxemia, and repeated miscarriage.

Nephritis	22 cases or 58%
Preeclampsia	6 cases or 26%
Eclampsia	No cases
Vomiting	2 cases or 50%
Atrophy	3 cases or 100%

Of interest are 15 patients in the nephritic group who had a history of previous pregnancy toxemia, while none of the preeclamptic or eclamptic patients had such a history. One nephritic patient had had a previous antepartum eclampsia and another eclampsia postpartum. One vomiting patient had had a similar toxemia with her first baby, and one of the patients who had acute yellow atrophy of the liver had had a previous eclampsia.

Onset of Toxemia.—This is not always possible to determine. A number came to the clinic with toxemia already present. If the history of the onset was not clear, it was fixed at the time when the patient was first seen. The average time, in weeks, is here shown.

	AVERAGE	EARLIEST	LATEST
Nephritis	28	10	39
Preeclampsia	34.5	25	38
Eclampsia	31.5	27	36
Vomiting	9.25	4	20
Atrophy	25	4	39

The well-known fact that nephritic toxemia is apt to begin earlier in gestation than hepatic types is here clearly shown.

Physical Examination.—In the early toxemias there was often no objective pathology. Later marked changes were noted. In the nephritic group edema, anasarca, enlarged heart, and frequent systolic murmurs were encountered; there was one case of mitral stenosis and one of polyhydramnios; none had syphilis. In the preeclamptic group edema, muscular twitching, and eye symptoms were prominent; one patient was stuporous; one had syphilis. The patients who had eclampsia presented the typical findings. Among the cases of atrophy two patients had syphilis; two were stuporous and markedly jaundiced. One patient with pernicious vomiting had a double mitral lesion. The

retinal findings were more pronounced in those women who had nephritis, many having arteriosclerosis, tortuosity of the vessels, and one edema of the retina. One woman with impending eclampsia showed fresh hemorrhages and exudate but most of the others in this group had normal fundi.

The Antepartum Course.—The blood pressure and urinalysis, the clinical symptomatology, and the laboratory results were studied.

It is impossible to present graphically the blood pressure readings, but these were taken frequently, by the same observer. In the majority of instances there was a rough agreement between the severity of the patient's condition and the height of the blood pressure, but this was not always so. Thus, a woman with a nephritic toxemia and a pressure of over 250 mm. Hg systolic felt well, although she delivered a macerated premature infant; another with eclampsia who had five or six convulsions at no observed time had a tension of over 140 mm. Hg systolic, although readings were taken immediately before and after several convulsive seizures. Albuminuria was present in relatively greater amounts in the hepatic than in the nephritic group.

The laboratory work embraced two major divisions; viz., studies of the urine, and studies of the blood. As has been said, the quantity of urobilin in the urine was considered important. It was found that there was less than the normal average (3 mg. per 100 c.c.) of urobilin in both the nephritic and the control series. This is in sharp contrast to the hepatic series where more than twice the normal amount is to be found. There is no apparent relation between antepartum and postpartum figures for the individual case. Thus, one nephritic toxemia patient showed 44 mg. of urobilin on the second postpartum day, this woman having the highest degree of urobilinuria in the entire nephritic series, and being of particular interest in that she had had eclampsia with her first baby.

In types of toxemia where liver damage has been thought to be most marked, the greatest amounts of urobilin were found. It is interesting to note that urobilinuria was more marked postpartum in preeclampsia than in eclampsia, possibly because liver damage was suffered over a longer time in the nonconvulsive toxemia. Very high degrees of urobilinuria were noted in vomiting patients, but the highest figures were to be found in those patients with liver atrophy who recovered. As might be expected these showed little or no urobilinuria antepartum, as the liver was presumably so badly damaged that the *anlage* of urobilin could not be excreted. Its presence postpartum can then be taken as a measure of improvement, showing that the liver is becoming "unlocked."

Those patients who showed a degree of urobilinuria higher than the normal fell into the class of hepatic toxemias with great regularity. Moreover, the nephritic toxemia patients very rarely presented any pathologic increase in the excretion of this substance.

In order to be reassured that urobilinuria was a function of pregnancy toxemia per se, separate protocols were drawn up to include those whose physical status was complicated by tuberculosis, syphilis, etc. Of these only lues, and then only when treated with arsenic, may have been the cause of the urobilinuria in 1 or 2 cases.

A series of two-hour renal function tests was done according to the method of Mosenthal. There was no demonstrable relation between impaired or normal fluctuation of specific gravity, and nitrogen retention, hypertension, or fetal mortality.

The nitrogen partition of the blood was estimated to include the NPN, the urea N, the uric acid, and in some cases the creatinine, and the amino acid N. The sugar was also studied, and in some cases the CO_2 combining power of the plasma, the icterus index, and the quantitative van den Bergh reactions. The quantitative determination of urobilin in the blood was done. The NPN-urea N ratio was computed. This ratio is of interest in that it has been considered of value as a differential diagnostic point between nephritic and hepatic toxemias.

A summary of the blood chemistry findings includes the following:

1. The averages of a large number of determinations are presented, and variations are slight.

2. There is a striking lack of nitrogen retention except in cases of liver atrophy with subsequent renal damage.

3. The NPN is lower postpartum than antepartum in hepatic toxemias, while the opposite is true in nephritis.

4. The urea N is absolutely very low, a fact which may be explained by its ready diffusibility in the amniotic fluid and increased blood volume.

5. The uric acid is consistently high in eclampsia and acute yellow atrophy of the liver.

6. The amino acid N, which is increased only in cases of atrophy of the liver, tends to be a little higher during the postpartum period.

7. No conclusions can be drawn from the figures on sugar, as they varied within such narrow limits.

8. The icterus index was increased postpartum in eclampsia, and was very high in liver atrophy.

9. The urobilin in the blood was below the normal average of 0.1475 mg. per 100 c.c. in all cases.

10. The NPN-urea N ratio was higher in the preeclamptic group than in the nephritic group.

The Postpartum Course.—For the sake of contrast all the laboratory work has been considered with the antepartum section. Of interest were the late findings in a number of patients. Six months to a year after delivery persistent hypertension was occasionally encountered in patients who had left the hospital with a normal pressure. It is important not to classify the toxemias clinically too early.

Twins were delivered twice in the preeclamptic group and once to a patient who had nephritis. There was one maternal death, a patient with acute yellow atrophy of the liver who died undelivered.

SUMMARY AND CONCLUSIONS

A series of toxemias of pregnancy has been studied from a clinical and laboratory viewpoint. The controls consisted of patients having normal pregnancies. Classification was made clinically, and the laboratory findings were then examined. The liver function was studied by means of the nitrogen partition of the blood and by the quantitative determination of the urobilin in the urine.

1. The routine chemistry of the blood and urine is of little value in differentiating the hepatic and nephritic toxemias of pregnancy.
2. Urobilinuria is usually not present to a pathologic degree in nephritic toxemias, but it is generally found in hepatic types.
3. Urobilinuria furnishes a further prognostic aid in differentiating these two types of pregnancy toxemia.

I wish to take this occasion to express my thanks to Dr. Hervey C. Williamson who conceived the problems studied in this paper, and under whose direction it was prepared; to Dr. Earl Brewer, who helped with the laboratory work, and to Dr. John A. Killian, under whose supervision a large part of the chemical work was done.

STRUMA OVARII AND INTRALIGAMENTOUS CYSTIC MYOMA EXHIBITED IN THE SAME PATIENT

Report of a Case, With a Brief Comment on These Rare Neoplasms

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THE addition of another case report to a medical literature already flooded with such items must inevitably be prefaced, if not by an apology, at least by an explanation. The history which follows is considered worthy of record for three reasons: that the combination of the multiple pathologic conditions found is unusual in a single patient; that struma ovarii and intraligamentous cystic myoma are, according to the literature, decidedly rare tumors and seem never to have been reported in association; and that the patient's history exhibits some very remarkable features, chiefly the recurrent attacks extending over a period of many years and finally brought to an acute stage by a complete revolution of the pedicle of the strumous ovarian growth.

Mrs. L. C. S., a white woman thirty-five years of age, was admitted to Touro Infirmary July 25, 1931, complaining of sharp pain in the right lower quadrant of the abdomen, associated with nausea and vomiting. For the last five years she had suffered at monthly intervals with attacks of a similar character, which, however, were not related to menstruation. The pain was always of a stabbing quality and so severe that it frequently had to be relieved by morphine, and nausea and vomiting were always associated. The acute attack usually lasted twenty-four hours, and the abdomen remained sore for three or four days afterward. The recurrent ill-

nesses naturally brought about a chronic condition of weakness and exhaustion, and there was a story of a considerable loss of weight.

On May 29, 1931, about two months before the patient was admitted to the hospital, the periodic attack of pain persisted for a week instead of for the usual twenty-four hours, and the abdominal soreness lasted for ten days instead of the usual three or four. In addition, the nausea and vomiting were more pronounced than in previous attacks, and some fever was present for two days. No further attacks occurred until July 19, six days before admission, when she had a sudden attack of dizziness, followed by fainting; weakness and nausea persisted after she regained consciousness.

Fig. 1.—Extended McBurney incision. *U*, uterus studded with myomas; *L. O.*, dermoid cyst of left ovary; *R. O.*, struma ovarii of right ovary with twisted pedicle; *I. C. M.*, intraligamentous cystic myoma in right broad ligament, extending under right tube posteriorly.

The usual pain did not occur until the following day, but then was of such severity that she was forced to cry out for assistance, and only a large dose of morphine brought relief. All the symptoms, pain, nausea, and vomiting, persisted, unaffected in any way by the daily bowel movement; the temperature ranged between 100° and 101° F., and weakness was progressively more marked. When the patient was finally brought to the hospital by her local physician, after a trip of thirty-odd miles by automobile, she was greatly weakened and exhausted.

Previous History.—In most respects the family and past history seemed to have no bearing on the present condition. There was no history of hyperthyroidism in the family, the patient being questioned on this matter after operation, when the nature

of the ovarian tumor had been discovered. Menstruation was normal in regard to onset, flow and periodicity, though cramping pains were regularly present on the first day. The recurrent attacks of pain, as has already been noted, apparently had no influence whatsoever upon any aspect of menstruation, and the usual type of period had occurred some two weeks before admission to the hospital. For some ten years the patient had suffered with chronic constipation which was relieved only by frequent and rather strong laxatives. Her two deliveries were without incident except that at the second, three years ago, she had been told that she had a right-sided pelvic tumor, and since then it had been suggested to her at intervals that a possible rupture of this growth could account for her attacks of pain and the associated symptoms. Until the present time she had consistently declined surgical intervention.

Examination showed a thin, pale woman, who looked feverish and ill and who seemed to be in acute abdominal distress. Temperature on admission 100.6° F., pulse 120, blood pressure 120/80. The general examination was negative, and investigation of the thyroid after operation showed no enlargement. The distended abdomen was generally tender, but localized pain was noted only over McBurney's point; in this area there could be palpated a definite and very tender mass, the exact limits of which could not be determined. Pelvic examination revealed a parous cervix and a uterus one and a half times its normal size, which was studded with small myomas and which was firmly fixed in the normal anterior position. In the right broad ligament and in the culdesac there could be palpated a mass apparently connected with the uterus, which it seemed to be holding in the anterior position, but it was too low, too firmly fixed and not nearly tender enough to be considered as the same mass which had been palpated abdominally. Further pelvic examination was impossible because of the patient's acute discomfort.

The urine was normal except for the presence of acetone (two plus). No other laboratory examinations were made, as the patient's condition was apparently too acute to warrant further delay and immediate surgical intervention was clearly indicated.

A preoperative diagnosis of appendiceal abscess, associated with uterine myomas, seemed entirely reasonable, though ruptured ectopic pregnancy and torsion of a pedunculated uterine or ovarian tumor were also considered as possibilities. The postoperative diagnosis, however, proved to be multiple uterine fibroids. right intraligamentous cystic myoma, bilateral dermoid cysts of the ovary, chronic periappendicitis, and chronic cholecystitis.

Operation.—Operation was undertaken with the idea of rectifying only the supposed acute abdominal disease, which was considered to be located in the appendix, and for that reason a McBurney incision was made. The choice proved to be unfortunate, for before the operation could be concluded the wound had to be enlarged in both directions to permit the removal of the uterus and the adnexa, and exposure was by no means as simple as it would have been through another approach.

Successive revelation of the various conditions present within the abdominal cavity was remarkably interesting. As soon as the abdomen was opened there was seen at the lower angle of the incision a very soft mass, which lay apparently within the right broad ligament and completely beneath the peritoneum, while at the upper angle there appeared a hard, purplish, hemorrhagic structure which was surrounded by a fibrinous exudate and which extended downward and was adherent to the soft tumor just described. The upper mass at this time was considered, chiefly because of its color, to be the under surface of the liver, though its relation to the gall bladder could not be determined because the latter structure could not be identified.

As soon as the urinary bladder had been located and had been ruled out from the soft broad ligament mass, this tumor was enucleated by incision through the peritoneum of the broad ligament, and its uterine attachment, which was just then discovered and through which it apparently received its blood supply, was severed.

Examination after removal showed it to be an intraligamentous myoma undergoing cystic degeneration.

Since the acute symptoms quite evidently could not be attributed to this neoplasm, further investigation was undertaken, and because the uterus was studded with multiple myomas, supravaginal hysterectomy was decided upon. As soon as it had been brought up into the wound by clamps applied to the inner aspects of the broad ligaments, another tumor, which proved to be a dermoid cyst of the left ovary, was revealed in the culdesac. Left salpingo-oophorectomy was done, and supravaginal hysterectomy was completed by the usual technic. Peritonealization was satisfactory, although the closure of the large raw area left after the enucleation of the intraligamentous myoma was not altogether easy.

When the pelvic work had apparently been completed, attention was directed to the structure which had been assumed to be the liver, but which now proved, on further investigation, to be a dermoid cyst of the right ovary whose pedicle had undergone one complete revolution. The torsion of this tumor unquestionably was responsible for the acute abdominal distress. When it had been removed, together

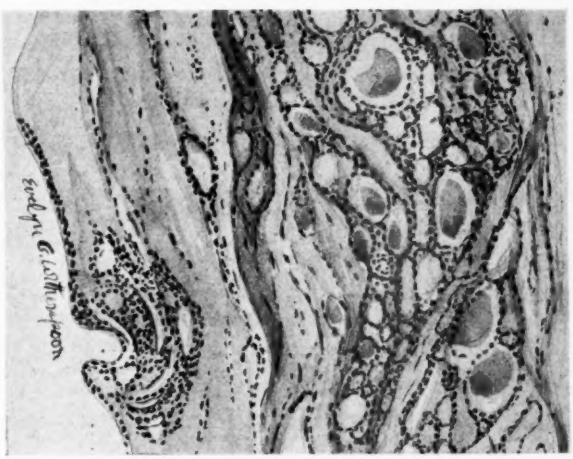

Fig. 2.—Microscopic section of struma ovarii, presenting thyroid tissue with colloid formation. Basal epithelial layer seen at edge of section.

with the right tube, the appendix, which had been lying beneath the mass, came into view. It was not intrinsically diseased, but was involved in a definite periappendiceal inflammation, which did not, however, seem to warrant its removal in view of the extensive nature of the surgery already done. Examination of the gall bladder showed it to be quite small and chronically inflamed; the wall was much thickened but no stones could be palpated. It was left undisturbed, and the wound was closed by the usual layer-to-layer approximation, without drainage. Because of the length of the incision four retention sutures were inserted.

It is impossible adequately to describe the distortion of the abdominal contents which this patient presented; a systematic exploration, with an orderly consideration of the measures to be taken, was entirely out of the question, and the procedure was literally a step-by-step performance, necessitated by the exigencies of the case as one complication after another presented itself.

Pathologic Report.—The pathologist's report (Dr. John A. Lanford) showed both tubes to be normal except for a fibrinous exudate on the right side. The uterus was studded with multiple interstitial and subperitoneal fibroid tumors. The report on the intraligamentous myoma and the ovarian tumors is considered sufficiently interesting to be quoted in detail, and it is herewith given:

"The intraligamentous myoma measures 16 by 8 by 10 cm., and it apparently had some connection with the uterus, for at one point it shows tissue which seems to have been excised from that organ. On section the myomatous tissue seems flabby, and there is one large area of cystic degeneration. While there are many small, firm areas, well encapsulated and arranged in whorls, the structures as a whole seem to be waterlogged.

"The right ovarian mass measures 12 by 6 by 6 cm. It is nodular in its make-up, with a fairly firm external surface of purplish-red color. It has a fluctuant feel in some areas, in others it is quite firm. On section it is multilocular, and teeth, hair, thyroid tissue and blood clots appear as its chief components. The cyst of the left ovary measures 12 by 6 by 6 cm., and is rather irregular in shape. It is grayish-white in color and is quite fluctuant on palpation. On section the wall exhibits the histologic structure of a multilocular cyst. The contents are creamy and cheesy, and quantities of hair are also present.

"The pathologic diagnosis is chronic perisalpingitis; dermoid cyst of the left ovary; teratoma of the right ovary in which thyroid tissue is marked (struma ovarii); right intraligamentous cystic myoma; myomata uteri."

The patient's recovery was without incident and she was discharged in excellent condition on the sixteenth day after operation. Four months later, she was perfectly well and strong, had regained much of the weight she had lost during her long illness, and exhibited no hernial weakness in her wound.

COMMENT

The origin of mixed ovarian tumors affords a tempting field for speculation, but such a discussion has no place in a purely clinical report. The constitution of such tumors, on the other hand, cannot be ignored because of the part the histology plays in fixing the nomenclature of these growths. Wilms, as long ago as 1895, showed that the term dermoid, as usually applied to ovarian cysts, was a misnomer which had arisen from an erroneous conception of their structure, then generally considered to be a simple ectodermal formation. At the same time, on the ground that all ovarian dermoids contain the three germinal layers, he advanced the dictum that there exist in the ovary no tumors composed only of skin. It was his opinion that the cystic type of dermoid should be termed embryoma and the solid type teratoblastoma. Somewhat later Pfannenstiel, who accepted Wilms' conclusions, made the additional point that ovarian dermoids or cystic tumors differ from ovarian teratomas or solid tumors chiefly because dermoids exhibit elements partially or completely recalling fetal or adult organs of the human body, and so are benign, whereas teratomas exhibit elements of the three germ layers growing with unrestrained license and exhibiting a cell structure atypical in form, size, and arrangement, and so are malignant.

At the present time the tendency is to refer to both cystic and solid ovarian tumors as teratomas, but to distinguish them on the basis of their physical characteristics. A cystic teratoma or dermoid of the ovary is defined as a tumor arising from all three fetal layers, in which the tissues are arranged in a more or less orderly fashion, and in which the structures arising from a single tissue type, the ectoderm, are usually predominant. Askanasy has offered the explanation that the elements

of the other fetal layers have either completely atrophied or have undergone a suppressed development, and in the absence of a more reasonable theory his hypothesis may be accepted. A solid teratoma of the ovary is defined as a tumor which likewise arises from all three germinal layers, but in which the tissues are mingled together indiscriminately and represent for the most part an embryonic development; on microscopic examination all the tissues of the body are found scrambled together and growing in an utterly lawless manner. Clinically, the chief point of interest is that, as would be expected, the dermoid tumor is benign, while the teratoma or disorderly tumor is highly malignant.

Graves, from whose scholarly discussion much of the foregoing material is quoted, declines to accept the present nomenclature absolutely. He seems to feel that the term "dermoid of the ovary" is firmly established in medical usage and conveys a perfectly definite meaning, for throughout the fourth edition of his text he continues to use it as a synonym for what he calls "the clumsier though more scientific term, cystic teratoma." For that matter, it is interesting to note in the literature that practically all the authors who seek a meticulously scientific designation of these teratoid tumors always, when they wish to make themselves perfectly clear, revert to the old terms dermoid and teratoma. The general impression that a tumor diagnosed as a teratoma is a tumor that is malignant is excellently illustrated by the sequence of events in this special case. The pathologist, perfectly scientifically and perfectly correctly, reported the specimen as a teratomatous tumor. The surgeon in charge of the case was perfectly aware of the new nomenclature, but practically, when it came to the test, he forgot it altogether, and he promptly sought out the pathologist, to inquire of him his ground for reporting a grossly benign dermoid cyst of the ovary as a highly malignant neoplasm.

A study of the literature reveals the fact that to date only 50 cases have been reported of struma ovarii, the type of tumor in which thyroid tissue is the sole or chief constituent, though thyroid tissue in small quantities is a fairly uniform finding in dermoid growths. Pick, in 1902, first advanced the theory, now rather generally accepted, that struma ovarii is a one-sided teratoma in which the thyroid anlage has dominated or completely supplanted the elements of the other germ-layers; the older idea was that thyroid tissue in such a location was metastatic and therefore malignant, which is not a very reasonable supposition in view of the fact that thyroid metastases are usually to bone. Pick felt that the significance of such tumors was the same whether they contained large or small amounts of thyroid tissue, and up to the present time it has never been established just what quantity must be present to justify giving to the tumor the designation of struma ovarii. In many reported cases the thyroid element is represented by small isolated and discrete nodules, although in other instances it constitutes the bulk of the tumor. When the thyroid tissue forms only part of the neoplasm, the other con-

stituents may include, either singly or in combination, skin, hair, cartilage, intestine, teeth, and sebaceous, sweat, and salivary glands.

The cystic type of struma ovarii has characteristics similar to those of the pseudomucinous ovarian cyst, but its colloid contents can be differentiated from the pseudomucin of the latter growth both morphologically and chemically. Solid strumous tumors are more cellular than the cystic type, and they tend to invade the surrounding tissues and to metastasize freely. Ewing is of the opinion that the so-called solid ovarian cancer may be a tumor of this type in which the thyroid elements have lost their distinctive characteristics.

Why thyroid tissue should develop in the ovary has never been established, and the theories advanced are not entirely satisfactory. Kretschmar's idea is ingenious, that it has the same origin as the hypertrophic tissue of a true thyroid tumor, but against it is the relative infrequency of strumous tumors as opposed to the decided frequency of goiters, as well as the fact that these neoplasms are no more frequent in the endemic goiter belt than they are in other localities. While some strumae ovarii contain iodine, its absence does not nullify the diagnosis, since it has been frequently pointed out that the fetal thyroid gland is normally lacking in this chemical element.

From the reported cases of struma ovarii certain clinical facts (Frankel and Lederer) may be gathered. These tumors are most frequent in women over forty years of age; they have been noted as early as twenty-two and as late as fifty-seven years of age. They vary in their rate of growth, and they seldom cause symptoms until their size or their location introduces the factor of mechanical pressure. Then constipation, retention of urine, and prolapse of the vagina are noted. Ascites was present in some 50 per cent of the reported cases, although malignancy was noted in only a few instances. Strumous tumors usually have a pedicle. They vary in size and shape, and they may be cystic or solid.

In 11 of the 50 reported cases thyroid tissue made up the whole tumor, but in only 2 cases was an associated goiter present. Kovács' patient presented a very interesting history, the subsidence of definite symptoms of exophthalmic goiter after excision of the ovarian growth. Trapl's case (Graves) suggests that a strumous tumor of the ovary may function vicariously for the thyroid gland itself. In one of Rohdenburg's cases an ovarian fibroma was associated with the struma ovarii.

The subject of intraligamentous cystic myoma has recently been thoroughly studied by Vidrine and D'Aunoy, who have collected 6 cases from the literature and who add to this group a case of their own. The records of Charity Hospital (New Orleans), according to these authors, reveal no case of this sort, and they quote Kelly and Cullen to the effect that none was noted in the 1600 cases of myoma uteri which they personally studied. The rarity of such growths is rather astonish-

ing; intraligamentous myomas are frequently encountered in pelvic operations, and while cystic changes are relatively rare in fibroids, they do occur, so that the association of the two conditions would seem, on the face of it, not to be unusual. A similar tumor, it might be remarked in passing, was found in a patient operated upon by C. Jeff Miller some months ago, but was not put on record.

The tumor in the case which is herewith reported was on the right side, and it is probably merely a coincidence that in all the cases heretofore reported it occurred on the left. The relations between the broad ligament mass and the uterus vary, as Vidrine and D'Aunoy point out, from almost complete isolation to a rather intimate connection, which probably represents the blood supply of the tumor. Eden, with whom Smith agrees, considers that this connection between the two structures rather strengthens the theory that such tumors originate from the uterus rather than from the smooth muscle tissues of the broad ligament. Failure to identify and isolate the ureter as it crosses over the top of the tumor may result in serious damage to it as extirpation of the cyst is proceeded with, but in other respects the operation is seldom difficult, chiefly because the myoma is usually well encapsulated.

SUMMARY

1. A case is reported in which there was exhibited, in addition to a dermoid cyst of the left ovary, multiple uterine fibroids, chronic periappendicitis, chronic perisalpingitis, and chronic cholecystitis, two rare pathologic conditions, intraligamentous cystic myoma and struma ovarii, the latter tumor presenting also a twisted pedicle which caused acute abdominal symptoms.

2. The nomenclature of cystic and solid teratomas of the ovary is discussed.

3. Struma ovarii is considered in its clinical aspects as they are set forth in the 50 cases reported in the literature.

4. The 7 cases of intraligamentous cystic myomas reported in the literature are briefly reviewed.

I am indebted to Dr. C. Jeff Miller for the privilege of reporting this case, which occurred on his private service at Touro Infirmary.

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THE FOTHERGILL OPERATION FOR THE CORRECTION OF UTERINE PROLAPSE, WITH A REPORT OF END-RESULTS*

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Philadelphia, Pa.

FOTHERGILL, of Manchester, after years of work, finally developed a standardized operation for the radical cure of uterine prolapse. Those who adopt his technic will have at their disposal a safe, simple and anatomically correct procedure, which gives uniformly permanent cures in approximately 100 per cent of the cases.

It is quite probable that this method of surgical treatment of prolapse will remain unchanged for some time to come, since the permanent results are as good as can be expected of any operative method.

The success of Fothergill's method stands out in marked contrast to the earlier procedures. Recurrences were all too frequent after vaginal work alone, although attended by improvement when combined with abdominal suspension or fixation, and whereas the interposition operation gives a higher percentage of successes than the vaginoabdominal operation, it is limited in its scope and is anatomically and physiologically unsound.

Clinical experience and anatomic research taught Fothergill that the pelvic viscera are not so much kept in their normal positions by being suspended from above or propped up from below, but that the uterus, vagina, and bladder are mainly held in place by combinations of unstripped muscle and connective tissue attached to the sides of the cervix and vagina. The overstretching of these structures, commonly known as the parametrium and paracolpium, is the chief contributing factor in the production of genital prolapse.

Based upon this information, Fothergill in 1907 advocated, before the Edinburgh Obstetrical Society, a method of anterior colporrhaphy in which the incision was carried well up and out on either side of the cervix, fully exposing the paracolpium and part of the parametrium, so that the closure of the wound brought together in front of the cervix structures which were formerly at its sides. Thus the cervix was carried upward and backward into the hollow of the sacrum, leaving the uterus in a position of anteversion.

This procedure sufficed for those patients in whom the cervix was not elongated. Subsequently, in 1913, he found that by carrying the vaginal incision around behind the cervix, instead of in front of it, anterior colporrhaphy and amputation of the cervix could be conveniently combined in a simple, one piece operation, instead of being done separately and in a series.

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*Read at a meeting of the Obstetrical Society of Philadelphia, December 3, 1931.

This procedure not only saves time and trouble, but fully exposes the parametrium as well as the paracolpium. When the wound is closed, the stump of the cervix passes backward and upward and the uterus is left in its normal position of anteversion.

The appreciation of retroversion as a causative factor in the production of recurrences, led to the combining of abdominal suspension or fixation with vaginal procedures in the treatment of prolapse. However, the risk is immediately increased, and the convalescence lengthened once the abdomen is opened.

Fothergill's method eliminates the abdominal operation, and it cures the worst cases of uterine prolapse by vaginal surgery alone. Furthermore, this treatment is applicable to women of all ages, since the retention of a uterus with a three-inch canal permits pregnancy to go on to term.

Any operation for the correction of genital prolapse which leaves a rectocele uncorrected, especially if there is an accompanying prolongation of Douglas' culdesac, is courting trouble for the future. We believe that our method of procedure for its correction has added somewhat to our successful results. We remove a long narrow triangle of vaginal wall, whose apex is high up just behind the cervix, while its base curves along the margin of the perineum. In the patients in which Douglas' culdesac is prolonged we ligate the sac as high up as we conveniently can. In closing the apex of the triangle we use the Kelley figure-of-eight suture, which when tied forms a natural cup-shaped posterior fossa. The remaining closure of the wound is made with a combination of superficial and deep interrupted sutures of No. 3 thirty-day chromic catgut. Our aim is not to have too narrow a vaginal canal. Indeed, when we have completed the procedures we are able to introduce at least one finger comfortably into the vagina as far back as the cervix.

TECHNIC OF THE OPERATION

1. *Prolapsus With Short Uterus and Healthy Cervix, With or Without Cystocele.* (Fig. 1.) Pull down the cervix with a volsella and pick up with forceps to points in the lateral fornices directly right and left of the os externum, and about three inches apart. Push the cervix back into the hollow of the sacrum and see if the forceps will come together in front of it without undue tension. If they approach each other too easily, move them wider apart. If they will not meet, move them nearer together, and so on until suitable points in the lateral fornices are found. Pick up a third point half an inch behind the urethral orifice. Cut through the whole thickness of the vaginal wall between the three pairs of forceps so as to mark out a triangle with its base just in front of the cervix, and its apex just behind the urethra. (Fig. 2.) Separate and remove the triangle of vaginal wall. Close the wound from side to side with interrupted catgut sutures. The first suture is passed just in front of the cervix, in the center of the base of the triangle, which is pulled first into a diamond-shaped figure and then into a median line as the suturing from above downward proceeds. (Fig. 3.) All but the first three or four sutures must be tied with the uterus pushed well up into the vagina. (Fig. 4.) The cervix

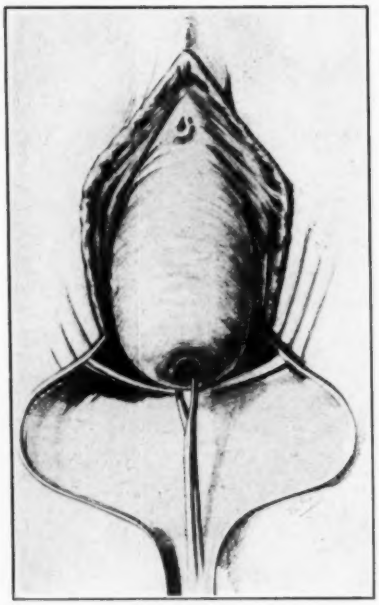

Fig. 1

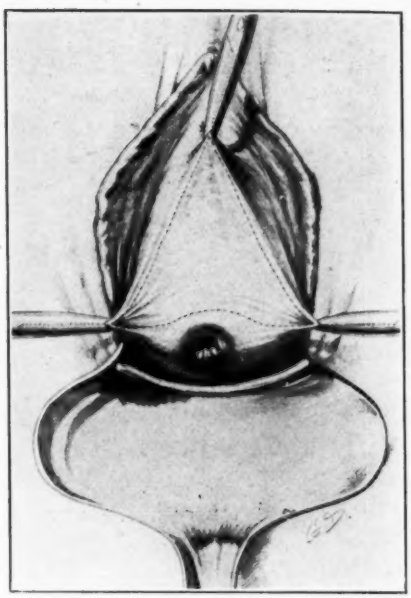

Fig. 2

Fig. 1.—Prolapsus exposed for operation. (Eden and Lockyer, *New System of Gynecology*. By courtesy of The Macmillan Company.)

Fig. 2.—Operation for prolapsus. Incision for anterior colporrhaphy without amputation of cervix. (Eden and Lockyer. By courtesy of The Macmillan Company.)

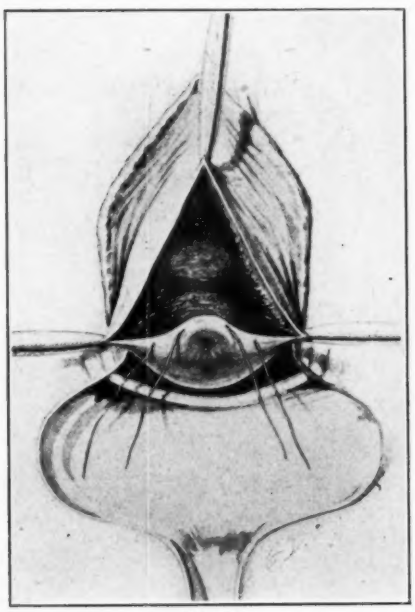

Fig. 3

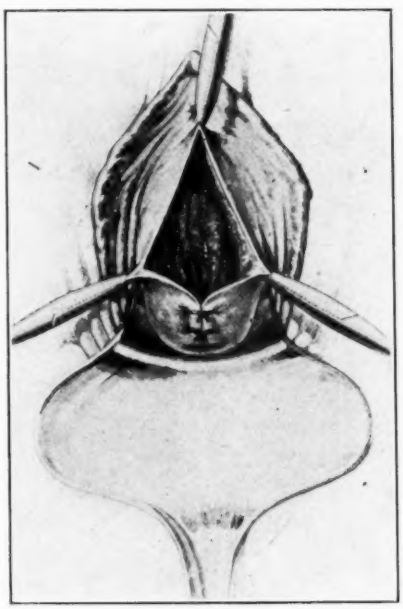

Fig. 4

Fig. 3.—Operation for prolapsus without amputation of cervix. Triangle of anterior vaginal wall removed to expose parametrium and paravaginal tissue. The first and second sutures are shown. (Eden and Lockyer. By courtesy of The Macmillan Company.)

Fig. 4.—Operation for prolapsus without amputation of cervix. As the incision is closed, the cervix disappears upward and backward. For purpose of illustration it is here shown pulled more downward and forward than it is in practice. (Eden and Lockyer. By courtesy of The Macmillan Company.)

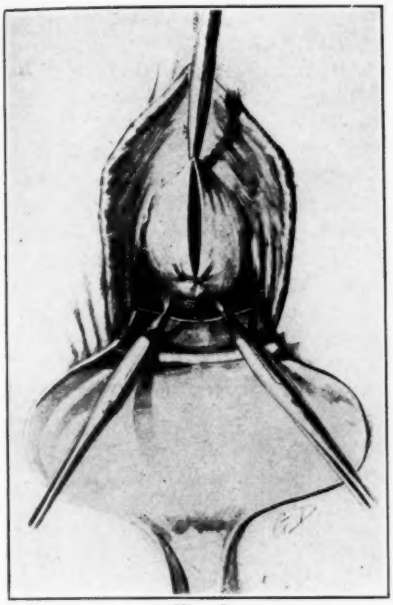

Fig. 5

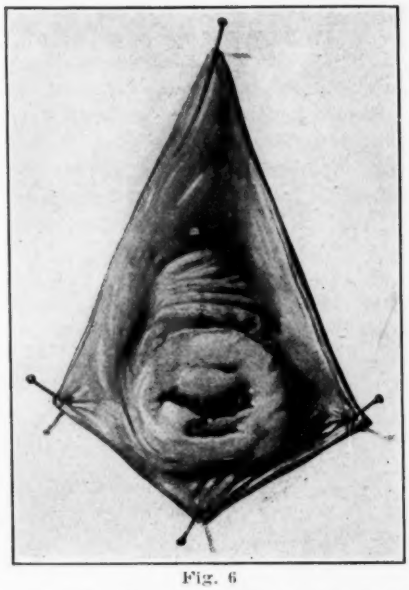

Fig. 6

Fig. 5.—Operation for prolapsus. The cervix has disappeared and lower part of incision is held forward by forceps for purposes of illustration. (Eden and Lockyer. By courtesy of The Macmillan Company.)

Fig. 6.—Operation for prolapsus by amputation of the cervix, combined with anterior colporrhaphy. The specimen consists of the porton of vaginal wall removed together with the cervix. (Eden and Lockyer. By courtesy of The Macmillan Company.)

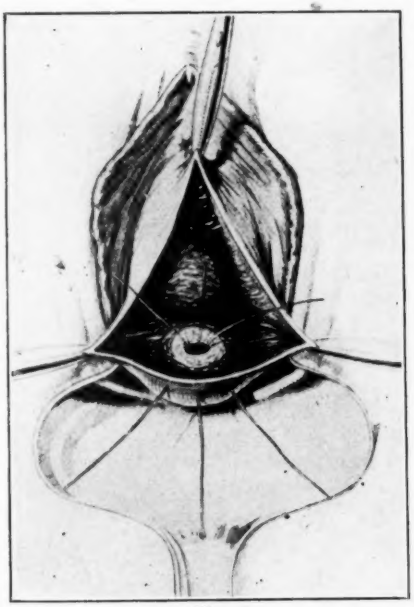

Fig. 7

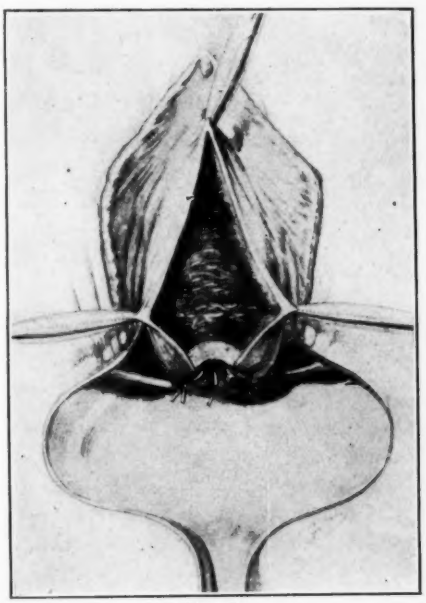

Fig. 8

Fig. 7.—Operation for prolapsus by amputation of the cervix, combined with anterior colporrhaphy. The incision is made, the vaginal wall and cervix have been removed, and the first three stitches inserted. (Eden and Lockyer. By courtesy of The Macmillan Company.)

Fig. 8.—Operation for prolapsus by amputation of the cervix combined with anterior colporrhaphy. The first three stitches are tied. (Eden and Lockyer. By courtesy of The Macmillan Company.)

should disappear from view as the lower sutures are inserted and tied. (Fig. 5.) This operation alone would cure prolapse without any repair of the perineum. But the vagina should be restored to its normal size, shape and position. Perineorrhaphy by a good method should always be done, after bleeding from the anterior colporrhaphy wound has been checked, if necessary, by the insertion of extra sutures.

2. *Prolapsus With Long Uterus or Unhealthy Cervix, With or Without Cystocele. Anterior Colporrhaphy With Excision of the Anterior Fornix Combined With Amputation of the Cervix in One Piece. Perineorrhaphy.* Pull down the cervix with a volsella, dilate it, curette and measure the length of the uterine cavity, thus ascertaining how much cervix will have to be removed in order to leave a uterine cavity three inches long.

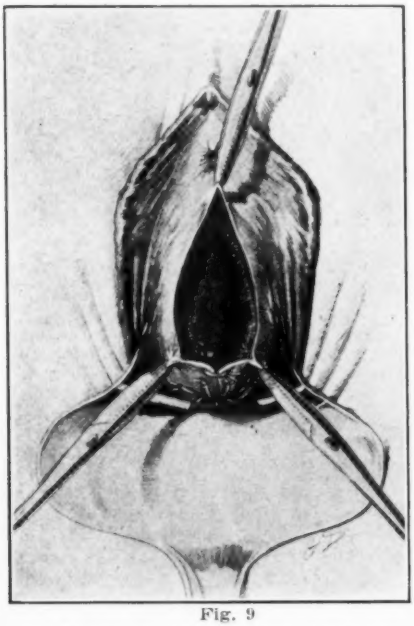

Fig. 9

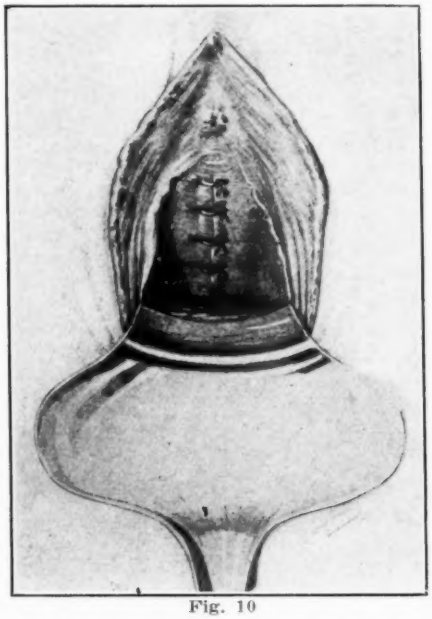

Fig. 10

Fig. 9.—Operation for prolapsus by amputation of the cervix combined with anterior colporrhaphy. The suturing of the new os uteri is completed, and the first stitch from side to side has been inserted. (Eden and Lockyer. By courtesy of The Macmillan Company.)

Fig. 10.—Operation for prolapsus by amputation of the cervix combined with anterior colporrhaphy. The suturing of the wound completed, showing that the stump of the cervix and the upper part of the wound have disappeared from view. (Eden and Lockyer. By courtesy of The Macmillan Company.)

Pick up the vaginal wall at two points in the lateral fornices directly right and left of the os externum (or even a little behind it) and about three inches apart. Apply another pair of forceps half an inch behind the urethral orifice, and a fourth behind the cervix at the cervicovaginal junction in the middle line. Cut through the vaginal wall so that the incision joins the four pairs of forceps and marks out for removal a quadrangular area with two long sides in front and two short sides behind. (Fig. 6.)

Strip off this quadrangle of vaginal wall from the urethra, bladder, and parametric tissue, working from below upward until it remains attached only around the cervix. Then, pulling up the flap of vaginal wall snip round and round the cervix until a sufficient portion of it is set free. Then cut straight across the cervix so as to leave the uterus with a cavity three inches long. The amputated portion of the cervix thus comes away in one piece with the quadrangle of the vaginal wall.

Pass the first suture of hardened catgut into the cervical canal in the midline behind, and bring it out through the vaginal wall in the midline behind. (Fig. 7.) Tie this and insert the second to the left of it so as to unite cervical mucosa and vaginal wall. Tie this and insert the third to the right of the first. (Fig. 8.) The fourth is on the left, the fifth on the right, and so on, until the cervical stump is covered, and the new os externum is surrounded by vaginal wall. (Fig. 9.)

Next insert a suture through both vaginal edges of the wound and bring them together in front of the cervix. In order to tie this suture without tension, the stump of the cervix should be within the vagina, and should be pushed up and back toward the hollow of the sacrum. The remaining sutures are passed from side to side through the cut margins of the vaginal wall, and are inserted in a series from above downward. (Fig. 10.) They are tied inside the vagina, and as the sides of the wound come together, the stump of the cervix, with the upper part of the line of sutures, passes completely out of sight upward and backward. For this reason bleeding should be checked as the suturing proceeds, for once the lower sutures are tied, the upper ones cannot easily be brought down into view again.

This operation leaves the uterus in a position of anteversion, and repair of the perineum is not required to cure the prolapse. But it is desirable to restore the natural size, shape, and slope of the vagina, for a defective perineum is a reparable accident favorable to the recurrence of prolapse. Therefore the operation should be completed by repairing the perineum.

In 1921, Fothergill published the end-results of 156 operations which were done in 1914, 1915, and 1916. These patients were traced, and as far as possible, examined. Of these 150 stated without qualification that they were cured, while 6 did not; but of these 6, 2 were found on examination to be free of anatomic prolapse, which gave a percentage of 97.3 of permanent cures. Twenty-six of his patients had 30 children subsequent to their operations, and of these 26, 23 had had their cervices amputated. Of the 30 labors 23 were natural and 7 were instrumental.

We are able to report a total of 138 of our own patients operated upon between 1918 and 1930. Of these 113 were traced by questionnaire, the majority of whom were also examined. Persistent effort was made to trace the others but they could not be located. Of the 113, 111 stated without qualification that they were cured; 2 stated that they were not. This gives 98 per cent definitely cured. Of the 113 patients traced, 47 were in the childbearing age, and of these, 11 had 13 children and one had a miscarriage subsequent to the operation. Ten of these labors were normal and 3 were instrumental. Of the 12 who had had labors, in 10 the cervix had been amputated.

In our series there were 5 nullipara who had uterovaginal prolapse with inversion of the vaginal walls. In Fothergill's classification there were 32 cases of this type. It is well known that this form of prolapse is a most difficult type to cure.

In conclusion, we believe that the high percentage of cures obtained in our cases would alone justify this publication. Our dominant pur-

pose, however, in bringing this subject to the attention of the profession, is to awaken our colleagues to a keener appreciation of the value of an operation, which should long since have been universally adopted as the standardized operation for the treatment of genital prolapse.

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716 MEDICAL ARTS BUILDING.

(For discussion, see page 293.)

A STUDY OF FETAL MORTALITY*

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THIS study was undertaken to determine the fetal mortality rates obtained by various methods of delivery in series of comparable cases and consists of an analysis of the 2635 cases delivered in the University Hospital Maternity Department between January 1, 1927 and November 1, 1931. Among these cases there were 230 fetal deaths, 42 between the eighteenth and twenty-eighth weeks of pregnancy which were eliminated from further consideration because of prematurity entirely incompatible with extrauterine life, and 188 cases of fetal death in deliveries beyond the twenty-eighth week of pregnancy. This gives us a fetal mortality rate of 7.13 per cent corrected only for prematurity below twenty-eight weeks of pregnancy. A review of the literature shows such widely varying fetal mortality rates based upon such markedly different standards that to quote mortality rates alone without analyzing the cases on which such rates are based would be useless and, in fact, misleading. For example, DeLee quotes a fetal mortality rate of 3.38 per cent at the Chicago Lying-in Hospital in 16,157 babies weighing over 1500 gm. The fetal mortality rate for Paris is 9.0 per cent; Glasgow 13.6 per cent, and Edinburgh 11.5 per cent. It is scarcely conceivable that these marked differences in fetal mortality rates are due alone to varying degrees of skill and judgment among the various obstetricians concerned.

From the standpoint of time of fetal death, we find there were 68 antepartum, 49 intrapartum, and 71 neonatal deaths in our series of cases. It should be stated that all babies who showed any sign of life after delivery and died within the first ten days of life are classed as neonatal

*Read at a meeting of the Obstetrical Society of Philadelphia, December 3, 1931.

deaths. In as much as the method of delivery can have no influence on the outcome of a case in which the fetus is dead before labor begins, I have corrected all the rates to be given, by the elimination of the cases of antepartum death.

A study of Table I shows a group of 59 cases of death of the fetus due to traumatism. This entire group may be considered as preventable deaths under perfect conditions and perfect care. The second group of 37 cases in which death resulted from interference with the fetal circulation contains some preventable deaths and others that would be unavoidable even under the most ideal conditions. The third group of 20 cases of fetal deaths due to fetal abnormalities consists of absolutely unavoidable fetal mortalities. The remaining 72 cases are of both inevitable and preventable deaths.

TABLE I. CAUSES OF FETAL DEATH

		NO. OF CASES
Fetal Traumatism		59
A. Asphyxia	17	
B. Intracranial hemorrhage	16	
C. Birth injuries (unclassified)	15	
D. Injuries due to disproportion	4	
E. Trauma of prolonged labor	2	
F. Postmaturity	2	
G. Craniotomy	2	
H. Fractured skull	1	
Interference With Fetal Circulation		37
A. Abruptio placentae	12	
B. Prolapsed cord	10	
C. Knotted cord	3	
D. Cord around neck	2	
E. Pressure on cord	2	
F. Extremely short cord causing abruptio placentae	1	
G. Twist of cord	1	
H. Ruptured uterus	1	
I. Exsanguination	1	
J. Narcosis asphyxia	1	
K. Presumable effect of amytal on fetal heart	1	
L. Nuchal arms causing delay in delivery of aftercoming head	1	
M. Delay in delivery of aftercoming head	1	
Fetal Abnormalities		20
A. Atelectasis	6	
B. Hemorrhagic disease of newborn	3	
C. Monsters	2	
D. Congenital deformities	2	
E. Hydrocephalus	2	
F. Enlarged thymus	1	
G. Stenosis of trachea	1	
H. Stenosis of common duct	1	
I. Congenital heart disease	1	
J. Failure of respiratory center (5 days neonatal)	1	
Prematurity		17
Toxemia		24
Syphilis		10
Placenta previa		6
Cause of death unknown		15

POSITION AND PRESENTATION AS FACTORS IN FETAL MORTALITY

This group of cases comprised 54.34 per cent of our entire number of deliveries. The low fetal mortality rate of 1.65 per cent in the cases delivered by forceps is explained by the fact that a large percentage of these cases were simple control forceps in which death of the child would be actually inexcusable. From the practical standpoint such cases might very properly be considered as spontaneous deliveries and had this been done here the fetal mortality rates in the spontaneous and the forceps deliveries probably would have been reversed. Attention is called to the high fetal mortality rate among the cases delivered by podalic version and breech extraction.

This group comprises 12 per cent of our total number of cases. One is immediately struck by the high fetal mortality rate in occipitopos-

TABLE II. VERTEX PRESENTATION—OCCIPUT ANTERIOR POSITION

Total number of cases	1432
Fetal deaths	63
Antepartum fetal deaths	24
Intrapartum fetal deaths and neonatal fetal deaths	39
Fetal mortality	4.4 %
Corrected fetal mortality	2.77%

CHARACTER OF DELIVERY	TOTAL NO. CASES	FETAL DEATHS			FETAL MORTALITY	
		ANTE-PARTUM	INTRA-PARTUM	NEO-NATAL	UNCORRECTED PER CENT	CORRECTED PER CENT
Spontaneous	893	18	6	16	4.47	2.51
Forceps	488	4	2	6	2.45	1.65
Version	46	2	5	4	23.91	20.45
Cesarean section	5	0	0	0	0	0

TABLE III. VERTEX PRESENTATION—OCCIPUT POSTERIOR POSITION

Total number of cases	333
Fetal deaths	44
Antepartum fetal deaths	7
Intrapartum and neonatal fetal deaths	37
Fetal mortality	13.21%
Corrected fetal mortality	11.35%

CHARACTER OF DELIVERY	TOTAL NO. CASES	FETAL DEATHS			FETAL MORTALITY	
		ANTE-PARTUM	INTRA-PARTUM	NEO-NATAL	UNCORRECTED PER CENT	CORRECTED PER CENT
Spontaneous	39	4	1	2	18	8.57
Spont. Rotation Forceps Extract.	72	0	0	2		2.77
Manual Rotation Forceps Extract.	36	0	1	0		2.77
Scanzoni Maneuver	131	1	11	9	16.03	15.38
Version	37	1	3	4	21.6	19.44
Cesarean Section	14	1	3	1	35.71	30.77
Delivered as posterior occiput	4	0	0	0	0	0

terior positions. Without regard to the method of delivery we find a fetal mortality rate of nearly five times that of occipitoanterior positions. Our lowest fetal mortality rate was obtained in those cases delivered by waiting for spontaneous rotation of the occiput before applying forceps, which meant in most instances a low or control forceps delivery, and in those cases delivered by manual rotation and forceps extraction. Other methods of delivery instituted before spontaneous rotation had occurred gave us a decidedly higher fetal mortality rate.

TABLE IV. VERTEX PRESENTATION—OCCIPITOTRANSVERSE POSITION

Total number of cases	98
Fetal deaths	16
Antepartum fetal deaths	3
Intrapartum and neonatal fetal deaths	13
Fetal mortality	16.32%
Corrected fetal mortality	13.68%

CHARACTER OF DELIVERY	TOTAL NO. CASES	FETAL DEATHS			FETAL MORTALITY	
		ANTE-PARTUM	INTRA-PARTUM	NEO-NATAL	UNCORRECTED PER CENT	CORRECTED PER CENT
Spontaneous	6	0	1	2	50.	50.
Spont. Rotation Forceps Extract.	11	0	0	0	0	0
Manual Rotation Forceps Extract.	3	0	1	0	33.33	33.33
Forceps Rotation Forceps Extract.	60	2 (1 mac.)	0	3	8.33	5.17
Version	8	(1 mac.)	0	1	25.	14.28
Cesarean Section	5	0	1	0	20.	20.
Delivered as post. occiput	1	0	0	0	—	—
Craniotomy	4	0	4	0	100.	100.

The condition of high transverse arrest or occiput persistent transverse position is usually considered a difficult one to handle without rather marked injury to the fetus, yet in our series of 98 cases, we find a fetal mortality rate only slightly greater than that of occipitoposterior positions. This is due largely to the use of the Barton and the Kielland forceps and the securing of a good cephalic application rather than an oblique application such as would be the case if other forceps had been used. In most instances the Barton or Kielland forceps were used only as rotators and extraction was done with the Dewees' or Piper's axis traction forceps. Except for this one group of 60 cases delivered by forceps rotation and forceps extraction, our number of cases delivered by any one method was too small to eliminate the element of chance so that no conclusions may be drawn as to the relative safety to the fetus of any particular method of delivery.

Breech presentation, due to imperfect dilatation by the soft compressible breech, pressure on the cord after delivery of the umbilicus, and difficulty in delivery of the arms and the unmolded aftercoming head,

always endangers the life of the child and causes a high rate of fetal mortality. Our series of breech presentations is no exception to this rule. As may be seen from Table V the majority of our cases of breech presentation are delivered by decomposition and extraction of the breech as soon as the cervix is completely effaced and dilated. With us, spontaneous delivery in breech presentations occurs only in cases of precipitate delivery, usually in premature labors. Our results, as shown in Table V do not warrant a continuance of this procedure. Extraction of the breech after spontaneous delivery as far as the umbilicus has given us a very much lower fetal mortality rate. There is one point of

TABLE V. BREECH PRESENTATIONS

Total number of cases	112
Fetal deaths	24
Antepartum fetal deaths	11
Intrapartum and neonatal fetal deaths	13
Fetal mortality	20%
Corrected fetal mortality	12.62%

CHARACTER OF DELIVERY	TOTAL NO. CASES	FETAL DEATHS			FETAL MORTALITY	
		ANTE-PARTUM	INTRA-PARTUM	NEO-NATAL	UNCORRECTED PER CENT	CORRECTED PER CENT
Spontaneous	8	2	0	0	25	0
Simple Breech Extraction	33	2	0	2	11.43	6.06
Decomposition and Extraction	15	1	1	2	26.66	21.43
Decomposition and Extraction with forceps on aftercoming head	52	5	3	4	23.07	14.9
Cesarean Section	3	1	0	0	33.33	0
Craniotomy on aftercoming head	1	0	1	0	100	100

special significance to be learned from a study of Table V, viz., the very considerable reduction in fetal mortality in cases in which the Piper forceps have been used for delivery of the aftercoming head as compared with those cases in which the aftercoming head was delivered by the Mauriceau, Wiegand, Deventer or Prague methods. It is now the routine practice at the University Hospital for the attending obstetrician to apply the aftercoming head forceps in all cases in which delivery is not easily and quickly accomplished by the other methods and our statistics show a steady fall in fetal mortality as our experience with these forceps increases. The technic of the application of the Piper aftercoming head forceps, while not difficult, is quite different from that of the usual forceps application and must be followed closely to obtain the best results.

ABNORMAL PRESENTATIONS

There were 47 cases of abnormal presentations in our series with a total of 10 fetal deaths. Of these 6 were antepartum and 4 were intrapartum and neonatal deaths. This gave us a fetal mortality of 21.27 per cent and a corrected fetal mortality of 9.75 per cent. Seven of the ten cases of fetal deaths were complicated by prolapsed cords.

METHOD OF DELIVERY AS A FACTOR IN FETAL MORTALITY

The very low fetal mortality rate of 1.71 per cent in low forceps is due to the inclusion in this group of a large number of control forceps cases which for all practical purposes may be considered as spontaneous deliveries. However, it serves to emphasize the fact that it is the use to

TABLE VI. FORCEPS

Total number of cases	949
Fetal deaths	57
Antepartum fetal deaths	12
Intrapartum and neonatal fetal deaths	45
Fetal mortality	6%

TYPE OF FORCEPS DELIVERY	TOTAL NO. CASES	FETAL DEATHS			FETAL MORTALITY	
		ANTE-PARTUM	INTRA-PARTUM	NEO-NATAL	UNCORRECTED PER CENT	CORRECTED PER CENT
High	84	1	11	7	22.61	21.68
Mid	332	3	9	9	6.32	5.47
Low	533	8	1	8	3.19	1.71

Corrected fetal mortality	4.8%
Incidence of birth injuries from forceps	64—6.78%

which the forceps are put, and not merely their application, that determines the fetal morbidity and mortality. Thus we find three times as high a mortality rate in mid forceps applications, and twelve times as high a mortality in high forceps, as in low forceps. Although I am not prepared in this paper to quote actual figures, still the statement may be accepted as a fact that maternal morbidity and mortality in forceps deliveries parallel the fetal morbidity and mortality. Table VI also shows an incidence of 6.78 per cent of birth injuries due to the use of forceps. Our conclusion is obvious. Unless there are definite indications for the early use of forceps they should be employed preferably after the biparietal diameter of the fetal head has passed the level of the spines of the ischii or has at least advanced to mid pelvis. The fetal mortality in high forceps deliveries is so high that it should be a strong deterrent to such use and when conditions warrant it, cesarean section with its much lower fetal mortality and maternal morbidity should be done instead.

PODALIC VERSION AND BREECH EXTRACTION

This operation was performed in 156 cases with a total of 36 fetal deaths, giving us a fetal mortality of 23 per cent. There were 13 ante-

partum deaths, leaving 23 intrapartum and neonatal deaths with a corrected fetal mortality of 16 per cent. Only a small percentage of these cases truly could be called elective versions. Most of them were done for placenta previa, abruptio placentae, malpresentations, etc., so that our fetal mortality seems to us to be entirely satisfactory. Four cases in this group in which disproportion was diagnosed but which the operator considered so slight as not to contraindicate version, terminated in the death of the fetus and again point to the conclusion that cases of suspected or known disproportion ought to be delivered by cesarean section, never by version.

CESAREAN SECTION

A total of 129 cases showed 18 fetal deaths and a fetal mortality rate of 14 per cent. Inasmuch as six of these were antepartum deaths we had a corrected fetal mortality rate of 9.1 per cent in the 12 intrapartum and neonatal deaths. All of our fetal deaths in cesarean section were either absolutely unavoidable or were due to improper handling of the case before operation. Some of these babies might have been saved by early operation but under the conditions that existed when these patients were brought to the hospital no other method of delivery would have been any more successful. Such cases prove very definitely that cesarean section as a last resort cannot be expected to reduce fetal mortality. Early recognition of complications of pregnancy or labor which indicate cesarean section, and prompt operation are absolutely essential to a successful termination of the case.

EMBRYOTOMY

Eight cases of craniotomy are included in our series. Except when performed on a known dead fetus or upon monstrosities, embryotomy is a confession of improper judgment in the handling of the case. Five of our cases confirm this statement. Had the true situation been recognized and the patients sent in to the hospital early enough these five babies might have been saved by cesarean section.

OTHER FACTORS IN FETAL MORTALITY. TOXEMIA

In 40 of our cases toxemia was either the sole, or at least, the chief cause of fetal death. There were definite evidences of toxemia in 340 cases so that our total fetal mortality due to toxemia was 11.76 per cent. Our best results in toxemia cases were obtained in spontaneous deliveries. In agreement with the generally accepted idea that the fetus in toxemia cases stands shock and traumatism as badly as does the mother, we found that operative methods of delivery other than cesarean section increased our fetal mortality.

PLACENTA PREVIA AND ABRUPTIO PLACENTAE

We had a total of 40 cases of placenta previa with 5 antepartum and 14 intrapartum and neonatal deaths giving us a total fetal mortality

of 47.5 per cent and a corrected fetal mortality of 40 per cent. Thirty-nine cases of abruptio placentae with 10 antepartum and 8 intrapartum and neonatal deaths were also encountered. Our total fetal mortality in these cases was 46.15 per cent and our corrected fetal mortality was 27.58 per cent. Such small series of cases scarcely warrant drawing definite conclusions as to the relative value of various methods of delivery. However, our best results were obtained in these cases by cesarean section.

POSITIVE WASSERMANN CASES

A blood Wassermann test is made on every patient admitted to the Maternity department of the University Hospital and positive reactions repeated as a check. All patients with positive Wassermanns are immediately referred to the department of Syphilology for active treatment. The benefit of this plan is shown by the fact that, among 238 syphilitic mothers, a positive Wassermann reaction was present in only 28 cases in which the fetus died and of these, only 10 babies gave sufficient evidence of syphilis to warrant ascribing their deaths to this cause. This gives us a fetal mortality due to syphilis of 0.038 per cent for our entire series and a fetal mortality among syphilitic mothers of 4.2 per cent.

SUMMARY

A total of 230 fetal deaths occurred among 2635 consecutive deliveries on the Maternity Service of the University Hospital in the past fifty-eight months. Of these 42 were under twenty-eight weeks of pregnancy and because of such marked prematurity are not analyzed in this paper. The remaining 188 cases consisted of 68 antepartum, 49 intrapartum, and 71 neonatal deaths of the fetus. There were 118 unavoidable and 70 preventable deaths. This last group of cases is the chief object of study in this report.

CONCLUSIONS

Many fetal deaths are due to causes entirely beyond the control of the obstetrician.

Vertex presentations give the lowest fetal mortality. Of these the ratio of fetal mortality between occipitoanterior, occipitoposterior and occipitotransverse position is as 1:4.5:5.

Breech presentations portend a higher fetal mortality rate, it being nearly 3 times that of vertex presentations.

Compound and transverse presentations give a high rate of fetal mortality, in our series due chiefly to a high incidence of prolapsed cord.

All operative procedures, other than cesarean section, increase fetal mortality and the earlier in labor the interference is undertaken the greater is the danger of fetal death. The ratio of fetal deaths in low, mid, and high forceps is as 1:3:12 respectively. Cesarean section performed after long labor does not materially reduce fetal mortality. In

contrast with other methods of accouchement force, the earlier cesarean section is done the lower the fetal (and maternal) morbidity and mortality.

Fetal mortality in toxemia of pregnancy depends upon the same factors as in nontoxemic cases plus the effect on the fetus of the toxins circulating in the maternal blood. This latter factor is so variable and so difficult to evaluate that definite conclusions are not warranted.

Although our number of cases is relatively small, our series of abruptio placentae and placenta previa cases show that early cesarean section gives the lowest fetal mortality of all methods of delivery.

The incidence of positive Wassermann reactions in our series of cases corresponds quite closely with that reported by Williams in 1920. Our fetal mortality due to syphilis however, is very much lower due undoubtedly to improved methods of treatment devised during the past eleven years.

1900 Rittenhouse Square. *(For discussion, see page 292.)*

RECONSTRUCTION OF THE URETHRA*

John A. McGlinn, M.D., Philadelphia, Pa.

VESICOVAGINAL fistula associated with partial or complete loss of the urethra, is a comparatively rare condition. Indeed, since the advent of better operative obstetrics preventing prolonged second stage labor, simple vesicovaginal fistula is seen much less frequently than in the times of Sims and Emmet and their coworkers. Repair of vesicovaginal fistula, especially if extensive and associated with much scar tissue, is a difficult operation and often disappointing in its results. In one case in this series, sixteen prior operations had been performed by experienced surgeons without success and a cure was obtained in the seventeenth attempt. George Gray Ward, in his paper on this subject presented in 1923, speaks of the difficulties to be overcome in curing extensive vesicovaginal fistulae as often appalling.

If the cure of simple fistula is often so difficult, it would seem that the additional complication of the partial or complete absence of the urethra, would present a condition so formidable as to deter a surgeon from attempting to correct the defect by plastic surgery. In 1880, Emmet reported that he had succeeded in six or seven cases in restoring the urethra, but also said he felt disposed not to waste his energy on the slim chance of success or permanent benefit from the operation.

Attempts to reconstruct the urethra have been made for many years. Marion Douglass, in a paper presented before the American Gynecological Society in May, 1931 reviews some of the historical aspects of this subject. In 1849, Lamballe discussed the causes and treatment of defects of the urethra. Baker Brown in 1863, made a urethra by producing a punctured wound with a trocar below the clitoris

*Read at a meeting of the Obstetrical Society of Philadelphia, December 3, 1931.

into the bladder. Into this opening he placed a silver catheter and eventually, after healing, the patient was continent. This was the first reported cure. Lawson Tait in 1878, made the first autoplastic repair of defects of the urethra and was followed by Schroeder, Freund and Pozzi. Kelley tunnelled the anterior vaginal wall in front of the fistula and transplanted a flap of vaginal mucous membrane, taken posterior to the opening, into the tunnelled tract.

In many of these early attempts, the operation was successful in constructing a new passage for the urine and in closing the fistula but the patient was still incontinent. What little success obtained was due to lengthening the tube and having its outlet at a higher level than normal. There was no sphincteric control. In 1918, Taussig did a unilateral transplant of some fibers of the levator ani muscle with a result so satisfactory that, it stood the strain of a subsequent pregnancy without loss of bladder function. Since then various operations have been proposed to utilize transplants from the levator ani and other muscles to obtain sphincter action.

Marion Douglass has recently reported three successful cases. In his operation, he uses a transplanted flat flap of vaginal mucous membrane with transplants from levator ani muscles to encircle the new tube. These cases have been followed for periods of from four to six years and except for the occasional escape of a few drops of urine, are entirely continent.

Dr. Fred J. Taussig, in a personal communication, writes as follows:

"I have had probably, all in all, about six cases in which there was a complete absence of the urethra and an attempt made to build up a new sphincter. Two of these resulted from an extensive laceration following childbirth and four followed primary carcinoma of the urethra with resection of the urethra and an attempt to build up a new urethra subsequent to this excision.

"I should say that none of my results have been more than partially successful. The best were obtained in cases of primary carcinoma of the urethra where a rim of bladder detrusor muscle with some little remnant of internal sphincter could be utilized at the time of the primary operation in the reconstruction of the urethra. Where a considerable time has elapsed and the sphincter has atrophied, results are very discouraging. Some fifteen or twenty years ago, I operated upon a case that had previously been operated upon by Price in Philadelphia and Kelly in Baltimore without success, and, I had what I would call an 80 per cent successful result. In this case, I took a flap of muscle from the levator on each side, swung it forward underneath the urethra and fastened it there to either side of the reconstructed canal. By a strange coincidence, Dr. H. S. Crossen, this very morning, operated on a similar case and employed the technic which I described at that time. I, also, in one operation where there was a rupture of the symphysis as well as complete rupture of the urethra at delivery, employed the technic of dissecting a strip of rectus fascia and pyramidalis muscle from either side and swinging it down under the urethra so as to exert an uplift pressure. In my case it was a failure. I am so pessimistic as to the possibilities of building up a new urethra satisfactorily, that in every case of carcinoma of the urethra in the past ten years, I have refrained from *complete* surgical excision but instead have used radium or gold radon seeds. The trouble with these urethras is not any difficulty in making a canal but in getting a sphincter that will function. In most of cases, there is a partial dribbling through the nozzle when the tea kettle fills up."

In ten years, 1910-1918, four cases of total destruction of the urethra were admitted for repair, to the Women's Hospital, New York. Reginald M. Rawls, operated upon three of these cases. In one case, he used the technic suggested by Taussig and after ten operations, succeeded in restoring the urethra and closing the fistula. In his second case, he restored two thirds of the urethra by suturing vaginal flaps over a catheter without attempting to transplant the levators. In his third case, he used the technic suggested by Ward in 1923, as modified by the suggestion offered by Farrar. This case was continent for forty-six months when she reported urgency and slight incontinence under emotional stress or any unusual exertion.

Carey Culbertson operated on one case in 1928. He used the technic of Dudley with an unsatisfactory result. The second operation after the Taussig technic was partly successful for continence. A third operation after the method of Douglass and McGraw was successful and when last seen in November, 1930, was still continent.

N. Sproat Heaney has recently operated upon a case by the Ward technic but the results have not been entirely satisfactory and the operation has been too recent to evaluate the final results.

I am informed that George Gellhorn and Reuben Peterson have recently operated upon cases of this type but their operations and results have not been published.

In the past three and one-half years, there have been published seventeen articles on reconstruction of the female urethra. This would indicate that, while the condition is a relatively uncommon one, the subject is receiving considerable study by gynecologic surgeons.

A careful reading of the literature indicates that various types of operation will succeed in restoring the urethra and in closing the fistula but fail in restoring continence. The late Dr. Polak, stressed the number of failures, even in the hands of expert plastic surgeons, and called attention to the brilliant results obtained in colon implantations of the ureters by the Coffey technic.

In 1923, George Gray Ward, reported a successful result in a case of large vesicovaginal fistula complicated by the absence of the urethra. The first operations were designed to reduce the size of the fistulous opening and restore the urethra by uniting flaps over a catheter. The operations were successful in reducing the size of the opening but failed in restoring the urethra and sphincteric control. He finally operated successfully, using the Kelly method and reinforcing the base of the bladder by a transplant from the labia minora, as suggested by Noble.

In the discussion Lillian Farrar made a valuable suggestion to improve the operation. She suggested that the vaginal flap be made wider so that the lateral edges could be united to form a tube and the tube, instead of a tongue of tissue, made to form the new urethra.

In a recent communication, Ward informs me that he has not had an opportunity to do the operation as suggested by Farrar. The operation has been performed by Guthrie and Haines, with failure; by Rawls successfully; by N. Sproat Heaney with partial success and successfully by me in two cases.

In my cases, I varied the technic as originally proposed by Ward and Farrar. In making the tube graft, the incision is started at the level of the anterior margin of the fistula, instead of the posterior margin. A flap, one inch in width, will form a tube approximately one third of an inch in diameter and with normal contraction of tissue, will form a tube, not more than one fourth of an inch in diameter. A narrower flap will form a tube of too small a caliber. Two fine catgut sutures on either side attach the pedicle of the tube to the posterior rim of the vaginal puncture, just in front of the fistula. A plain rubber catheter is now passed through the tube into the bladder so that five or six inches of the catheter is in the bladder. A traction suture is passed through the proximal end of the catheter and the excess of the catheter beyond the traction suture cut away. The tube with the inserted catheter is drawn through the tunnel and the edges of the tube sutured to the edges of the puncture wound, just beneath the clitoris. The anterior rim of the posterior puncture hole is now sutured to the posterior surface of the tube. The tube is thus anchored throughout its entire circumference to both the anterior and posterior puncture wounds of the tunnel, thus preventing leakage of urine to the operative field. The high point of starting the deundation for the formation of the tongued tube permits the encircling of the tube at the vesical end by a constricting band of tissue, after the method of Kelly. This is a most important step in the operation as it tends, as in my cases, to promote continence. The area of deundation in the vaginal wall is closed by interrupted sutures of catgut or in the exceptional case, by the method of transplant, as was done in Ward's case. The catheter is now partly withdrawn about four inches and fixed so that it cannot fall out of the bladder. The catheter remains in situ for eight to ten days. Taussig suggested suprapubic drainage but with a retention catheter functioning, I cannot see the need of this procedure.

I found this operation to be a very simple one, easily and rapidly performed. On account of its simplicity, ease of performance and promise of a successful issue, I believe it to be the operation of choice in this type of case. If the tube remains intact but continence is not gained, it can be supplemented at a later operation by surrounding the tube at the vesical neck by implants from the levator as suggested by Taussig and Douglass. The tongued tube graft is certainly superior to the flat flap of mucous membrane either drawn through a tunnel or sewed to the anterior vaginal wall and reinforced and covered with lateral vaginal flaps.

Undoubtedly, many cases will fail to give satisfactory results no matter what method or methods may be used. In these cases, we still have rectal implantation of the ureters by the Coffey technic. The Coffey method is a great contribution to ureteral surgery and when properly carried out, has yielded satisfactory results. The operation, however, is at times, exceedingly difficult and is not devoid of operative risk and postoperative morbidity and mortality. I am convinced that it should not be done in these cases until plastic repairs have been exhausted.

I have seen three cases of vesicovaginal fistula associated with complete absence of the urethra.

Case 1.—First seen in 1925, in Sayre, Pennsylvania at the Robert Packer Hospital. The patient had a difficult instrumental delivery in 1919 which was followed by a vesicovaginal fistula. From 1919 to 1922, when she entered the Packer Hos-

pital, she had been operated upon unsuccessfully twelve times in one of the larger cities. During the next three years, three attempts were made to close the fistula and reconstruct the urethra which resulted in failure. When I saw her, she had a fistulae about three-eighths of an inch in diameter and a complete absence of the urethra. I suggested the operation perfected by Ward and Farrar and with the aid of a few rough sketches and models of cut paper, made the technic of the operation understandable. She was operated upon by this technic, this making the sixteenth operation tried. Dr. Haines writes me "apparently there was a perfect result for several days following the Ward operation." Owing to several (15) former operations, with resulting scar tissue, there apparently was not sufficient blood supply to nourish the flap which necrosed. Subsequent to this failure, Doctors Guthrie and Haines transplanted the ureters into the colon and reported the successful result before the Medical Society of the State of Pennsylvania, October, 1926. Five years later, in 1931, other than a mild colitis at times, she is in excellent health and has no difficulty in bowel control of the urine.

CASE 2.—Married, white, aged twenty-eight. One child after normal labor, eight years ago. Incontinence of urine for the past two years. Examination discloses a vesicovaginal fistula, three-eighths of an inch in diameter at the site of the vesicourethral juncture. Except for the external urinary meatus, there is an entire absence of the urethra. We were unable to obtain from her history any facts which would point to the etiologic factors for the defects. No previous attempts had been made to close the fistula or reconstruct the urethra. She was operated upon eleven months ago by a modified Ward-Farrar method and when seen two weeks ago, was dry and continent.

CASE 3.—Virgin, white, with subnormal mentality, seventeen years of age. She had been under institutional care for some years and so far as we could learn, had always been incontinent. One attempt had been made to close the defect by the plastic flap method with failure. Examination revealed a vesicovaginal fistula, one-fourth of an inch in diameter and a complete absence of the urethra. Operation was not considered at this time. The difficulties of curing the defects by a plastic operation seemed insurmountable and the only procedure which gave any hope of a successful issue seemed to be transplantation of the ureters. I did not feel that I had the moral right to attempt such an operation in this case. The patient, on account of her age and subnormal mental state, was not qualified to assent to the operation, and we were unable to locate her parents or any near relatives.

I saw this patient a year later, after I had successfully operated upon the other patient. I now felt justified in attempting the same operation. The operation was done eleven months ago, by the same technic except that I had to make a wide lateral incision in the vagina in order to obtain sufficient exposure of the operative field. At the present, the result is satisfactory except that there is a dribbling if she allows the bladder to become overdistended. If she voids every six hours, she is both dry and continent.

While this case does not represent a complete and satisfactory cure, nevertheless, her condition at the present time is a marked improvement over her original condition. She is no longer a burden to the institution and is able to do the tasks assigned her.*

1900 RITTENHOUSE SQUARE.

(For discussion, see page 292.)

*Since reporting the above cases, case No. 3 returned to the hospital on December 3, 1931. In January of the present year, I reoperated. Examination disclosed the new urethra to be intact, but she had no sphincteric control.

In January of the present year, I transplanted a flap of the recti muscle with fascia attached, carrying the flap behind the symphysis and then splitting the muscles to encircle the urethra.

Up to the present date, the operation has been successful, inasmuch as she has full control of the bladder.

PRIMARY CARCINOMA OF THE OVIDUCT, WITH A REPORT OF TWO CASES*

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(From the Department of Gynecology and Obstetrics of The Brooklyn Hospital.)

THESE two cases of primary carcinoma of the oviduct are of unusual interest, first, because of the comparative rarity of the disease, and second, because in the first patient the uterus was not involved, while in the second patient the uterus was involved with tubal carcinoma.

CASE 1.—Mrs. C. B., colored, fifty-three years of age, married, was admitted to the Gynecological Service of The Brooklyn Hospital on October 11, 1931, complaining of severe, cramplike pains in the lower abdomen. The patient had been suffering for three months with cramplike pains in the lower abdomen and frequent micturition. A feeling of pressure on bladder and rectum had been growing constantly worse.

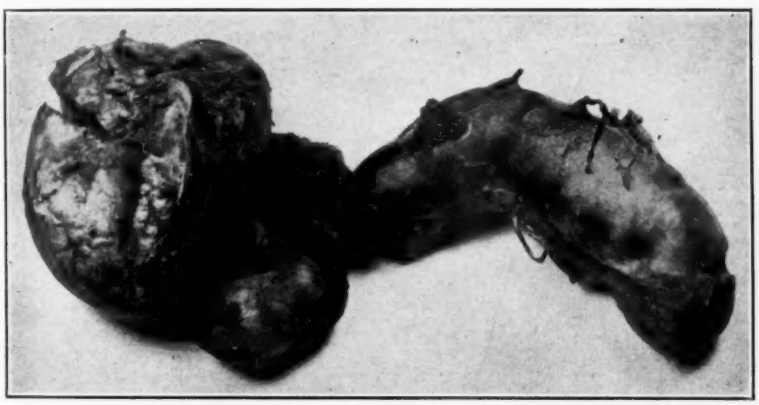

Fig. 1.—Case 1. Right tube an irregularly shaped mass 10 by 6 cm. in diameter, the left a sausage-shaped mass 12 by 5 cm. The mass in the center is the uterine body containing several small myomas.

For the last month constipation had been a troublesome factor. For the past year the patient had noticed a thin watery, bloody, foul vaginal discharge.

The menstrual history was that her periods had always been regular up to the time of her menopause, four years ago. Since then, there had been no vaginal flow until one year ago. The patient admitted three labors and two miscarriages, and the last pregnancy was twenty-three years ago. The urine was negative. Hemoglobin 93 per cent, R.B.C. 4,560,000, W.B.C. 11040, polymorphonuclears 69 per cent, sedimentation time thirty minutes.

On examination, the patient was large, stout, and had good color. There was no suggestion of cachexia, and she did not appear ill. Abdominal examination revealed a fixed, hard mass extending from the pelvis nearly to the umbilicus. The mass was irregular, and only slightly tender. Vaginal examination showed a multiparous introitus from which a thin bloody discharge was draining. The cervix was normal in size, and slightly eroded. It was fixed solidly into the hard, irregular, fixed pelvic mass. In the posterior culdesac there was a more elastic mass which pressed on the

*Read at a meeting of the New York Obstetrical Society, December 8, 1931.

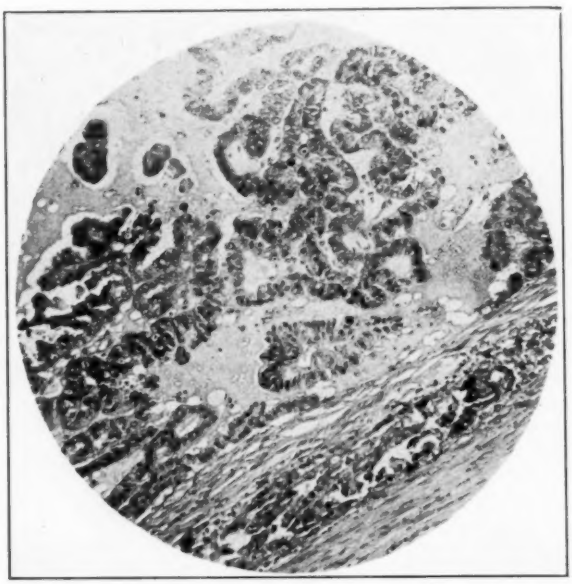

Fig. 2.—Case 1. Section showing tube wall at the bottom and papillary growth in the lumen with thin mucus between the projections of the tumor.

Fig. 3.—Case 1. Higher power showing details of the papillary structures and the resemblance to folds of oviduct mucosa.

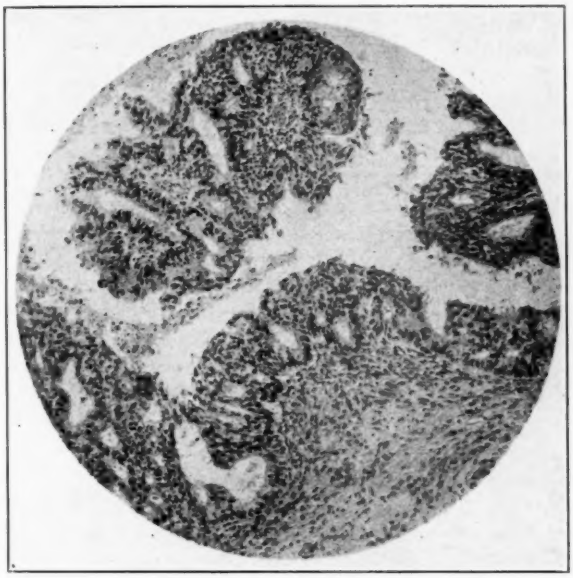

Fig. 4.—Case 2. Low power showing part of tube wall at the bottom and papillary projections of the tumor growing into the lumen.

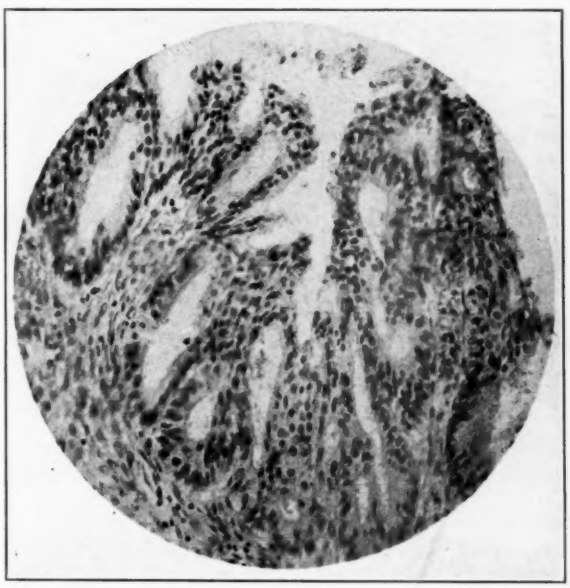

Fig. 5.—Case 2. Papillary formations are coarser than in Case 1. The epithelial cells are smaller and are more similar to those of normal oviduct epithelium.

anterior rectal wall. Rectal examination showed this mass to be the size of a good sized lemon, and that it markedly interferred with the lumen of the rectum.

A diagnosis was made of an old uterine fibroid with malignant degeneration. Exploratory laparotomy was advised with removal of the mass to relieve the pressure symptoms, even though the tumor was probably inoperable.

Operation.—Supravaginal hysterectomy with double salpingo-oophorectomy. The abdomen was opened in the midline below the umbilicus. Some free bloody fluid was found in the abdominal cavity. Adhesions were everywhere, old and dense. The mass was found to consist of a normal sized uterus surmounted by a fibroid the size of a small lemon. The remainder of the mass consisted of the right and left fallopian tubes. The ovaries were not identified. The tubes were markedly enlarged, measuring roughly, 4 by 2 inches, and had the appearance of chronic pyosalpinx. The adhesions were freed with difficulty, the uterus and tubes were removed unruptured, vessels ligated, and the abdomen was closed without drainage.

On account of this unusual history and findings, the pathologist was requested to examine the specimen at once. On gross examination of the contents of one tube, he made a probable diagnosis of carcinoma of the oviduct.

Gross.—Specimen consisted of a uterus with both tubes. The uterus was small, and had been amputated supravaginally. The upper part of the uterus contained a small myoma. The uterine cavity was small, the mucous membrane was thin, and pale red in color. The ovaries were not recognizable in the material. The right tube was a potato-like mass about 10 cm. long, and 7 cm. in diameter. Externally it was smooth. On section, the wall was about 4 mm. thick, and the cavity was filled with gray, softened tumor material. The left tube was sausage shaped, 12 cm. long, and 5 cm. in diameter. It was smooth externally. The wall was thin, and the cavity was filled with coagulated mucus. Growing from the internal surface were numerous warty, white outgrowths of tumor.

Histologic.—Sections showed a papillary mucus secreting tumor, which formed structures more or less like the folds of oviduct mucosa. In neither tube did it show a tendency to penetrate the muscular wall of the oviduct. The uterine endometrium showed no carcinoma.

Diagnosis.—Primary carcinoma of oviduct, bilateral.

The patient had a fairly smooth convalescence, and the wound healed by primary union.

We have one other case of primary carcinoma of the oviduct in the records of The Brooklyn Hospital.

CASE 2.—The history of this second case is as follows:

Miss E. H. was admitted to the Gynecological Service on October 7, 1924, with a diagnosis of adenocarcinoma of the uterine body. The pathologist confirmed the diagnosis from curettings, and 2400 mg. hours of radium were given. The patient was readmitted six weeks later and a complete hysterectomy and bilateral salpingo-oophorectomy were performed for adenocarcinoma of the corpus uteri. The pathologic diagnosis was primary bilateral adenocarcinoma of fallopian tubes, with extension of tubal carcinoma into the corpus uteri. Grossly, the tubes were not very large. Under the microscope the new growth in the uterine cavity very closely resembled tube epithelium.

The patient was again admitted on January 28, 1926, with a recurrence of carcinoma in the vault of the vagina. One thousand two hundred mg. hours of radium were given. The patient was in poor general condition, and probably died in Ireland during the following year.

370 WASHINGTON AVENUE. *(For discussion, see page 283.)*

OBSERVATIONS ON THE CYCLICAL PELVIC FLUID IN THE FEMALE*

A Preliminary Report

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MY PURPOSE in announcing the results, though incomplete, of a study which I am now making of the peritoneal fluid found in the pelvic cavity during the menstrual cycle, is simply to place on record a brief statement of some interesting findings made by me during the past fifteen years. Until recently I believed these observations commonly accepted by gynecologists. However, I find that they are not and also, that little has been written on this subject.[1] I began several months ago, with the kind cooperation of my colleagues at the Woman's Hospital, a systematic study of what I here term the cyclical pelvic fluid in the female. These observations point to the following conclusions: In the pelvic cavity of every woman with normally functioning ovaries, there is a fluid of a definite character, color and quantity. Under normal conditions this fluid is found collected in the culdesac, but, if a large fibroid of the uterus exists, some of it will be found anterior to the uterus and broad ligaments. In cases of third degree retroversion some of the fluid will be found above the displaced organ.

Its general appearance depends upon its cellular contents and the consistency seems to vary with the stages of ovarian activity. Its essential color may vary from pale green to light yellow or deep amber. The amount of fluid varies in every individual and in every stage of ovarian activity. In this series of cases the smallest measurable amount (half a drachm) was found between the last day of menstruation and the rupture of the graafian follicle; the greatest (2 ounces) between ovulation and the full development of the corpus lutem. The amount present during menstruation has not been noted by me,[2] as no operation was performed during the menstrual period.†

Varied pathologic conditions, such as simple fibroids and ovarian tumors, may be present, without an essential change resulting in the character of the fluid. Acute inflammations, papillary growths, etc., will, however, alter its consistency, color and volume, until the fluid is no longer recognizable.

The fact that no measureable amount of peritoneal fluid of any character is found in the pelvis of woman when the ovaries are not functioning, unless there exists a papilloma or some acute intraabdominal lesion, but is found in varied and measureable quantities during the stages of

*Read at a meeting of the New York Obstetrical Society, December 8, 1931.

†There were operations performed during uterine bleeding, but, as these patients flowed so irregularly (as the result of fibroid tumors or other pathologies), it was impossible to determine whether these flows were menstrual or not.

ovarian activity suggests that ovarian activity is responsible for the presence of the fluid.

The fact that the greatest amounts of the fluid have been found after the rupture of the graafian follicle, or between its rupture and the full bloom of the corpus luteum, suggests that the presence of the freed liquor folliculi in the pelvic cavity may act as a stimulus to the pelvic peritoneum; also, that the great activity during the development of the corpus luteum may play an important part in the increase of the fluid.

The cyclical pelvic fluid in the female is a physiologic fluid, and serves the definite purpose of transporting the ovum and extending the folds of the fimbriae to their full capacity, at the same time allowing them freedom of motion. Thus spread out in the form of tentacles, they reach well into the pelvic cavity and it is difficult for the ovum to escape. In cases where abnormal conditions of the adnexa exist, such, for example, as an ovary on one side of the pelvis from which the corresponding tube has been removed, and on the other side no ovary and a tube resected, but patent, and nevertheless pregnancy occurs, there can be no explanation more rational than that of the mechanical conveyance of the ovum from one side of the pelvis to the resected tube on the opposite side, by the fluid. As the ovum has no power of motion it must depend upon external force for its migration, and this can be no other than wave motion in the peritoneal fluid, caused by intestinal activity or muscle action of the abdominal walls, through breathing, etc.

As the ovary is the only pelvic organ in the female which is not covered with peritoneum, and as, throughout the entire menstrual cycle, fluid is found in the culdesac, it is reasonable to assume that another of the functions of this fluid is to protect the ovaries during their active functioning.

These conclusions are based upon a study of 37 unselected abdominal sections, in which cases were found such conditions as the following: simple retroversions, retroversions with complications, fibroid tumors of the uterus (with and without the previous application of radium), simple ovarian tumors, malignant papilloma of the ovaries, early pregnancy, chronic appendicitis, pelvic metastases occurring after carcinoma of the cervix had been treated by the application of radium, intrauterine polyp at time of menopause, and congenital ovarian deficiency with infantile uterus.

Studies are being made of the cellular contents of the fluid during the varied stages of ovarian activity, and it is hoped that the ovum will be found in it. This, however, can be expected during only a limited period after the rupture of the graafian follicle. The female sex hormone has not yet been demonstrated in the fluid. Experiments are being made with this in view. Observations are becoming more accurate with experience, and it is hoped that findings will be clarified with further study and analysis.

TECHNIC

In order to secure the fluid found in the culdesac, unmixed with blood from the abdominal wound, or elsewhere, great care is necessary. On incising the abdomen, each bleeding vessel must be ligated and oozing of blood stopped by hot gauze pads and pressure. When the peritoneal cavity is opened great care must be taken to prevent trickling of blood along the peritoneal wall. The patient is placed in a modified Trendelenburg position and the small intestines are lifted, with the hand, out of the true pelvis, and held above the brim of the pelvis by means of rubber envelop pads. The fluid is then withdrawn with an Asepto syringe, to the end of which is attached a short, straight, rubber female catheter. Care should be taken to avoid the catheter coming in contact with the wound, as any contact with the bleeding surface would necessarily convey blood to the fluid. If the uterus is in a normal position it should be forced slightly forward, by means of a trowel retractor, never by a vulsellum forceps, nor by any instrument which would occasion bleeding. If it is retroposed, the fluid situated above the corpus should first be withdrawn. The corpus should then be placed, manually, in an extreme anterior position, after which the remaining fluid in the culdesac may be withdrawn. During this process no gauze pads nor probangs should be used, as the fluid would be unavoidably absorbed thereby.

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219 West Seventy-Ninth Street.

THE FREQUENCY AND CAUSES OF PREMATURE BIRTH

A Report of 238 Cases

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THE causal relationship between premature birth and neonatal morbidity and mortality is well known. In many cases the reason for the shortening of the period of gestation is apparent, being preventable in some cases and not so in others. However, in not a few instances no cause can be found to account for the early loss of the products of conception.

The present report concerns the incidence of premature birth, but more particularly the frequency of cases in which no cause for the condition can be found. Records of a consecutive series of 238 immature infants and their mothers form the basis for the report.

An entirely satisfactory definition for prematurity is difficult to make. For the purpose of this study birth weight has been selected as the best criterion. A premature infant is considered to be one which weighs between 1500 and 2500 grams at birth. With this single criterion as a basis, the 238 records previously mentioned were selected.

In a study of 10,000 births, Zweifel[1] found that 965 (9.65 per cent) took place prematurely. His index of prematurity was also body weight; those labors were considered to be premature in onset, which resulted in births of infants weighing between 1,000 and 2,500 grams.

Feldman[2] gives 10 per cent as the frequency of premature births. This percentage is based upon statistics from the Moscow Foundling Hospital (5 per cent), the Clinic Tarnier (10.7 per cent), and from ones given by Pinard (15.4 per cent).

Many causes have been recorded. Hess, Chamberlain, and Lundeen[3] and Zeltner[4] together give reasons for a total of 404 such births. Twinning was found by them to be the most common cause, being responsible for approximately 55 per cent of the known causes. This was followed in order of frequency by toxemia (14.1 per cent), syphilis (7.6 per cent), cesarean operations and induced labors (a total of 3.7 per cent), heart disease (2.9 per cent), pulmonary tuberculosis (2.7 per cent), and nephritis (2.5 per cent). Less frequent causes included: placenta previa, operations in the presence of acute infections, trauma, toxic goiter, asthma, diabetes, epilepsy, pernicious anemia, pyelitis, encephalitis, acute yellow atrophy, shock, and pneumonia.

In a relatively large proportion of instances these authors found no satisfactory explanation for the prematurity. Zeltner[4] learned the cause in only 75 (31.2 per cent) of a group of 240 cases. Hess, Chamberlain and Lundeen[3] located it in only 307 (40 per cent) of 761 cases. It is evident from these figures that the cause of prematurity requires further study.

The 238 premature infants forming the basis for the present study represented 8.2 per cent of 2876 consecutive live births taking place during the period studied. This frequency is practically identical with that of others.

Of the 238 premature labors 47 (19.7 per cent) were induced and 191 (80.3 per cent) were spontaneous. The latter are the ones of chief interest in this study.

The maternal and infant records were searched for the possible causes

TABLE I

		NUMBER	PER CENT
Premature births of known cause		111	100.0
Diseases of uterus, contents, and appendages		73	65.8
Toxemia	28		
Twins	15		
Abruptio placentae	12		
Placenta previa	7		
Stillbirth	4		
Myoma uteri	2		
Premature rupture of membranes	1		
Pain from old suspension scar	1		
Ovarian cyst	1		
Placental infarct	1		
Hydrorrhea gravidarum	1		
Syphilis (positive Wassermann test)		21	18.9
Other conditions		17	15.3
Spinal and pelvic deformities	7		
Cardiorenal disease	4		
Pyelitis and cystitis	3		
Neurosis	1		
Imbecile mother	1		
Maternal pulmonary tuberculosis	1		

of the 191 spontaneous births, and as a result possible causes for 111 (58.1 per cent) were established (Table I). If these were not the true causes, they were associated conditions, and the only ones which were found to have any possible bearing upon the cause of the prematurity.

In 80 (41.9 per cent) of the 191 spontaneous premature labors no cause for the condition could be found. It would seem therefore, that approximately 42 per cent of spontaneous premature births, as they are observed in maternity hospitals pass without being satisfactorily explained. This figure indicates the size of the problem of prematurity of unknown cause as it exists today.

The relationship between maternal color and in the incidence of premature birth of unknown cause is shown in Table II. Apparently the condition is equally common in white and black women.

TABLE II

	ALL LIVE BIRTHS	PREMATURE BIRTHS	PER CENT
White patients	1823	50	2.7
Colored patients	1053	30	2.8

In Table III the ages of the women giving birth prematurely to infants, where the cause of the prematurity was not evident, are compared with the ages of an equal number whose infants at birth weighed 3,000 grams or more. The chief point of interest in this table is the fact that so many of the immature infants were born of mothers who were under twenty years of age.

TABLE III

MATERNAL AGE	INFANTS 1500-2500 GM.	INFANTS 3,000 GM.
14-19 years inclusive	22	9
20-24 years inclusive	22	26
25-29 years inclusive	16	21
30-34 years inclusive	12	13
35-39 years inclusive	7	9
40-44 years inclusive	1	1
45-49 years inclusive	0	1
Total	80	80

TABLE IV

	NUMBER OF PATIENTS	PER CENT
Previous pregnancies	44	100.0
Previous pregnancies, normal duration	32	72.6
Short term pregnancies	12	27.4
Miscarriages	4	
Premature births	8	(18.2)

Patient 1, 6 pregnancies, 6 premature; Patient 2, 6 pregnancies, 1 premature; Patient 3, 6 pregnancies, 1 premature; Patient 4, 2 pregnancies, 2 premature; Patient 5, 2 pregnancies, 2 premature; Patient 6, 2 pregnancies, 1 premature; Patient 7, 2 pregnancies, 1 premature, and Patient 8, 1 pregnancy, 1 premature.

Of the 238 women who had premature births, 44 (Table IV) had had previous pregnancies. Only 8 of these had had previous premature labors. The number of their pregnancies and the incidence of prematurity among them is also recorded.

No information is available concerning the causes of the earlier premature births of the 44 women. However, a fact of interest is that the incidence of *previous* premature births was more than twice (18.2 per cent) that of the ones under investigation (8.2 per cent).

SUMMARY

1. Of 2876 consecutive labors in two teaching hospitals, 238, or more than 8 per cent, were premature in onset, as measured by infant birth weight.

2. Approximately 80 per cent of the 238 premature births were spontaneous in onset, the remaining 20 per cent being induced by either medical or surgical means.

3. Of all spontaneous premature labors, the cause of 58 per cent could be determined. Disease or abnormality of the uterus, its contents or appendages was responsible for 73 per cent of known causes.

4. No cause for prematurity could be found in approximately 42 per cent of spontaneous births.

5. Spontaneous premature births of unknown cause were equally frequent in colored and white women.

6. Women under nineteen years of age give birth more frequently to premature infants, than do those in later years.

7. The incidence of premature births appears to be greater in women who have been previously delivered prematurely, than in the population at large.

The authors are indebted to Drs. Edmund B. Piper and Norris W. Vaux for the privilege of examining the records of the University Maternity and the Philadelphia Lying-In Hospital.

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THE USE OF EXTERNAL CEPHALIC VERSION IN AN OUTDOOR MATERNITY CLINIC*

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ALTHOUGH Wigand described this operation in 1807, it did not acquire a place among the obstetric operations until the beginning of this century and is infrequently used even at the present time.

At the Berwind Maternity Clinic, version was attempted 70 times upon 64 patients without the use of anesthesia. Eighty-seven per cent were successful (Table I). The majority were converted between the

TABLE I

	NUMBER OF CASES	ATTEMPTED VERSION	VERSION SUCCESSFUL	PER CENT SUCCESSFUL
Nulliparae	10	11	9	81
Primiparae	16	17	15	88
Multiparae	38	42	37	88
Total	64	70	61	87

thirtieth and thirty-sixth week, the earliest at the twenty-fourth week We advise that it be done as early as the twenty-eighth week, for this allows ample time for further attempt if unsuccessful and should the breech recur the version can be repeated, several times if necessary, before the onset of labor. Ryder mentions a case in which the fetus was turned four times. An external version was finally done in the first stage of labor under anesthesia, and the membranes ruptured to maintain the cephalic presentation. The patient had a normal delivery.

It seems to make little difference whether the baby is turned clockwise or counter clockwise, although we prefer turning the head towards the fetal small parts, but if an attempt in one direction fails we turn it in the opposite direction.

In 9 patients the version was unsuccessful. Four were in the last month of gestation and delivered as breech. Of the remaining 5, which were attempted before the thirty-fourth week, 4 delivered as vertex.

The difficulty of performing this operation is very much exaggerated. The resident staff and students have done the operation without difficulty. Occasionally a case is encountered which cannot be turned.

At times the breech recurs spontaneously after successful version, but can easily be reconverted. In 2 patients the version was performed twice and one three times before the presentation remained vertex.

*Read in part at the Section of Obstetrics and Gynecology at the New York Academy of Medicine, April 28, 1931.

Two cases successfully converted recurred spontaneously and delivered as breech, one of which had been turned twice. The frequency of spontaneous version decreases rapidly as full term is approached and seldom occurs in the tenth month.

Although practically all of the earlier writers advised that some sort of support, pillow, or bandage be applied to retain the fetus in its new position, we did not use any binder after successful version, as it was found that the proportion of recurrence is fully as great with as without bandages.

We do not use the Trendelenberg position nor the knee-chest posture to disengage the breech prior to version. The patient is placed on a flat table with knees drawn up and head raised to allow relaxation of the abdominal muscles, the bladder being empty. The breech of the baby is grasped, pushed upward out of the pelvis and to one side. Although some operators spend the great part of their effort in turning this pole, we direct most of our attention to moving the head down toward the pelvic inlet.

The age of these patients varied from eighteen to forty-four. The average parity was 2.6. Two were para xii, and in 3 cases the parity was not stated. In 11 the position was transverse and the remaining 53 were breech deliveries. In some cases after successful version, the head was not felt in the lower uterine segment by abdominal palpation but was readily determined by a vaginal examination. X-ray examination has been suggested as a further means of corroborating the position both before and after version.

We cannot agree with Miller that breech cases are fraught with little or no danger. The average fetal death rate in vertex presentation is 2 to 4 per cent. Meyer lists 20 authors reporting a mortality in breech deliveries between 10 to 40 per cent. Others (Polak, Golabin, Kraus, Pierson, Dubois, etc.) have found a death rate in primary breech deliveries from 10 to 37 per cent. In 4488 patients at Berwind Maternity Clinic there were 164 primary breech deliveries, with a gross fetal mortality of 12 per cent. A mortality of 10 to 15 per cent in primary breech deliveries is considered conservative. Add to this that in breech cases the mother runs more risk of deep tears, postpartum hemorrhage, and infection.

The average duration of labor was thirteen hours, the shortest was four hours, and the longest twenty-eight hours due to a large baby, weighing 11 pounds. The pelvis was generally contracted in 8 patients, absolute contraction in 1, simple flat in 3, funnel in 2, and rachitic in 3.

Contracted pelvis has been advocated as a contraindication for external version (Southwick, Martin, et al.), on the theory that the after-coming head is more easily delivered and that the breech presentation obviates the necessity for internal version. Internal podalic version and

extraction, however, is no longer the accepted operation in contracted pelvis. A trial of labor, followed by cesarean section if the head fails to engage, is now considered the better procedure. A great many patients with relatively contracted pelvis deliver spontaneously or with forceps after a trial of labor if the baby presents by the head, but might be subjected to cesarean section if the presentation were breech. It would, therefore, be especially desirable in relatively contracted pelves, to convert a breech to a cephalic presentation to allow of trial labor. Only in an absolute pelvic contraction is an external version not necessary as an elective section is indicated.

There was no fetal mortality in our series. Possible complications such as premature separation of the placenta, prolapse of the cord, rupture of the membranes, etc., were not encountered. There were two premature births which could not be attributed to the external version.

SUMMARY AND CONCLUSIONS

In 64 patients external cephalic version was successfully done in 87 per cent without the use of anesthesia. There was no fetal mortality, and no complications were encountered. The operation should be done as early as the twenty-eighth week to allow for repetition if the breech recurs, or it can be attempted at successive visits if unsuccessful at first. The baby can be turned in either direction and abdominal supports are unnecessary. The mortality of the fetus in breech deliveries is definitely greater (10 to 15 per cent) than in vertex presentations (2 to 4 per cent), but we have at our disposal a safe and comparatively simple operation of converting breech and transverse presentation to vertex by means of external manipulations. In relatively contracted pelves trial labor can be allowed with a vertex presentation, but would not if the presentation were breech, thereby reducing the incidence of operation.

55 East Eighty-Sixth Street.

REPORT OF A CASE OF UTEROPLACENTAL APOPLEXY IN ACCIDENTAL HEMORRHAGE

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LOS ANGELES, CALIF.

THE patient, aged twenty-five years, para ii, was first seen by one of us on May 28, 1931, at 6:30 P.M. at her home. She stated that at 1:00 P.M. she developed acute pain in the back extending to the right side of the abdomen. Later it became localized in the right iliac region, and was continuous and severe. Vaginal bleeding, dark in color in the beginning, later bright red, began suddenly with the onset of pain, and continued throughout the afternoon. She believes she used about fifteen napkins. Nausea was present, but patient did not vomit. There were momentary periods of dizziness, especially if she attempted to sit up or walk.

She attributed her condition to a nervous shock the day before. She was very nervous the remainder of the day and went to bed with a severe headache. A month before she had had a similar attack of lesser degree, following an accident in which her foot was caught in the step of a bus, twisting her body and causing her to fall to the ground. She was advised by her physician to remain in bed and apply an icebag, but he did not visit her. There was no bleeding at this time.

Her last period occurred on November 1, 1930. Nausea and vomiting were present during the second month. She had suffered from fleeting headaches, dizziness, and extreme nervousness, usually around the times of her expected periods. She does not know whether her blood pressure was high during this pregnancy, and if there was any albumin in her urine she was not so advised. She had been under treatment for the past two years for uterine displacement and "inflammation of the tubes." She had a tonsillectomy in September, 1930. She had a dead, abscessed right upper molar which had been tender for years.

Five years previously her first pregnancy was terminated by a difficult forceps operation after a long labor at term. Hypertension and albuminuria were present. The child is living and well. No history of abortions.

Her family and past personal history offer nothing of importance.

Examination: Pulse, 72; temperature 98.6° F.; respirations 26; blood pressure 140/80. She appeared to be suffering severe pain and was vainly attempting to find a position which would secure relief. Although of a florid coloring, there was a slightly ashen color in her face. The heart and lungs were negative. The abdomen was enlarged, and the uterus tetanic and of ligneous consistency. It extended to four fingers above the umbilicus. No fetal parts could be felt over any part of the uterus; marked tenderness was noted over the whole abdomen, especially over the right iliac region. No fetal heart tones could be heard after repeated examinations. The maternal pulse could be heard distinctly in both iliac regions and above the pubis. There were no uterine contractions.

Rectal examination showed about 1 cm. dilatation, no effacement, and the head felt low down. Nothing suggestive of a placenta previa could be felt.

She was sent to the Hollywood Hospital after an injection of morphine sulphate, gr. ¼, and atropine sulphate, gr. 1/150, which gave her considerable relief. A blood count taken at 8:00 P.M. showed hemoglobin 62 per cent; R.B.C. 3,160,000; W.B.C. 14,000; polymorphonuclears 88 per cent; lymphocytes 11 per cent; transitionals 1 per cent. Coagulation time four and a half minutes. A catheterized specimen of urine, sp. gr. 1,028, revealed two plus albumin and few granular casts and white blood cells.

Another red cell and hemoglobin count was taken at 10 P.M. after ⅓ grain of pantopon had been given hypodermically. The hemoglobin was 57 per cent; erythrocytes, 2,730,000. The pulse was 90. No fetal heart tones were heard and there were no uterine contractions. There was moderate vaginal bleeding of a serous nature.

A diagnosis of premature separation of the placenta and fetal death with possibility of uteroplacental apoplexy was made, and in view of the fact that the cervix was undilated, that there were no uterine contractions, and there were evidences of both external and concealed hemorrhage, it was though advisable to interfere while her condition permitted. Laparotomy with hysterotomy, or possible hysterectomy was the operation selected.

Operation was begun at 11:40 P.M. under ethylene-oxygen anesthesia preceded by injection of pantopon gr. ⅓.

With the patient in a moderate Trendelenberg position a median incision from above the umbilicus to the pubis was made and a moderate amount of serosanguineous fluid in the peritoneal cavity was revealed. The uterus was about the size of an eight months' pregnancy, ovoid and extremely hard, especially in the lower uterine segment. There was a widely diffused ecchymotic discoloration over the whole of the surface of the uterus, to a greater degree over the lower uterine segment which was almost black. The subperitoneal hemorrhage extended into the broad and infundibular ligaments. In the right infundibular ligament was a small hematoma. The fetal parts could not be felt. The ovaries were large and of the oyster type. The tubes, except for the ecchymoses, appeared normal. A normal appendix appeared in the field of operation and was not disturbed. On account of the widespread infiltration of the uterine muscle by the hemorrhage it was thought advisable to extirpate the uterus with contents as rapidly as possible.

A supravaginal hysterectomy of the intact uterus, conserving the tubes and ovaries, was performed in forty-five minutes. She was in fair general condition with pulse of 114 and good quality at the end of the operation.

Pathologic report (Dr. V. L. Andrews, pathologist): "Specimen is a uterus, enlarged, containing a male fetus of about seven and a half months. The serosa covering the anterior surface of the uterus is dark colored and the underlying muscle tissue is heavily infiltrated with blood for a distance of 5 mm. Section through the uterine muscle and exposing the fetus and contents, shows a large hemorrhage behind the placenta. The lower uterine segment segment composing the cervical canal is thin and the entire musculature is heavily infiltrated with blood. From the beginning of the internal os upward the infiltration of the musculature is more on the surface of the uterus than in the body of the muscle."

Immediately after operation 1000 c.c. of normal salt solution was given intravenously and alternating every four hours with 5 per cent glucose solution by hypodermoclysis. This was continued for forty-eight hours, followed by fluids by mouth which were well tolerated. Pantopon was given in sufficient amount to control pain and restlessness. On the third day she was placed on a soft diet, and was given liver extract with iron. There was no distention and the bowels moved well with the assistance of small enemas. There was a moderately severe cystitis following catheterization during the first twenty-four hours, and she complained of pain and paresthesia along the ulnar distribution in the left forearm and hand; this together with a hyperirritability and emotional instability was fairly well controlled by intravenous injections of a calcium chloride preparation daily for five or six days. A blood calcium determination on the fifth postoperative day was 7.9 mg. per 100 c.c. The hemoglobin was 41 per cent; R.B.C. 2,100,000. The urine was loaded with pus cells and two plus albumin.

The maximum rise in temperature occurred on the second and the sixth postoperative days when it was 100.4° F.; pulse was 110.

She left the hospital on her fourteenth postoperative day, having had a normal pulse and temperature for one week. Hemoglobin on discharge was 46 per cent; R.B.C. 3,010,000.

After leaving the hospital, she was placed on a liberal diet. Rest, cod liver oil, and continued use of liver extract and iron were prescribed. Vasomotor disturbances were very annoying and were controlled by biweekly injections of ovarian hormone. There was no vaginal discharge at the end of six weeks; the urine was negative. The vaginal stump was freely movable without pain.

On October 15, 1931, her weight was 116 pounds; hemoglobin 65 per cent; R.B.C. 4,200,000. There were no symptoms and she felt better than she had felt for years.

COMMENT

In this case, of toxemia, accidental torsion occurring the previous month with a mild reaction, combined later with a nervous shock were undoubtedly etiologic factors in the production of a uteroplacental apoplexy.

1052 West Sixth Street.

Wislocki, George B.: Observations on the Placenta from a Case of Malaria. Bull. Johns Hopkins Hosp. **47**: 157, 1930.

The study of the placenta from a case of malaria affords proof that the chorionic syncytium is incapable of phagocytizing an inert suspension of pigment present in the intervillous spaces or of transmitting such particles from mother to fetus. Malarial parasites are present in the placenta in great abundance within the erythrocytes in the intervillous spaces. Malaria induces the accumulation of large numbers of monocytes and lymphocytes in the placental circulation. Of these cells, the monocytes phagocytize abundantly pigment released by the activity of the malarial organisms. These phagocytic monocytes do not penetrate the fetal tissues, but do enter the masses of fibrin formed on the villi which are denuded of syncytium at these sites. Typical clasmatocytes are not encountered in the intervillous spaces. The monocytes and lymphocytes which gather in the placenta are brought there from other parts of the maternal body where they are produced. The villi, including their stroma and covering chorionic syncytium, are anatomically normal and not visibly affected by the malarial organisms or their products. It is unlikely that malarial organisms can enter or penetrate the chorionic syncytium, so that the transmission of malaria from mother to fetus occurs rarely if at all.

C. O. Maland.

Ronsisvalle: Ovarian Cystoma Complicating a Seven Month Pregnancy Masked by Ascites. Arch. ostet. e ginec. **17**: 474, 1930.

The author calls attention to diagnostic difficulties sometimes presented by ovarian tumors complicating pregnancy. He reports a case in which the presence of the cystoma was obscured by a large quantity of ascitic fluid in the abdomen.

Cases of this sort are not so rare. Removal of the tumor by laparotomy often permits pregnancy to continue to term.

Sydney S. Schochet.
Julius E. Lackner.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF DECEMBER 8, 1931

DR. WILLIAM S. SMITH presented a report of two cases of **Primary Carcinoma of the Oviduct.** (See page 267.)

DISCUSSION

DR. G. L. MOENCH.—I have observed only one case of primary tubal carcinoma in six years and that was limited strictly to the tube. Like some of the cases reported in the literature, the wall in this particular case was exceedingly thin, with a polypoid growth inside. The patient was subjected to operation, but she died in about eleven months of a brain metastasis.

DR. IRA I. KAPLAN.—In our service at Bellevue Hospital, during the past eight years we have had referred for radiation therapy only two cases out of several hundred gynecologic patients of carcinoma of the fallopian tube.

CASE 1.—N. W., aged twenty-nine, married. Was operated upon in December, 1926, for vaginal bleeding, following a seven weeks' period of amenorrhea. Operation revealed a carcinoma of one fallopian tube. In May, 1927, she returned to the hospital for recurrent bleeding since March, 1927. She was referred for x-ray therapy and reacted well to the treatment, all bleeding ceasing after treatment. She was seen again in November, 1928, and had had no bleeding and her general condition was good. Recent follow-up by the Social Service shows the patient alive in the summer of 1931, since which time all trace of her has been lost.

CASE 2.—F. D., aged thirty-two, married, referred to Bellevue Hospital for postoperative x-ray therapy. Previous to operation on January 7, 1929, she complained of pain and swelling in the abdomen. Operation revealed a carcinoma of the fallopian tube with metastases to the pelvis. Following irradiation the patient was fairly comfortable until June, 1930, the swelling of the abdomen became more marked and in August, 1930, she was again operated upon but an attempt to remove the tumor masses was unsuccessful. She died October, 1930, from generalized metastases.

In the two cases herewith reported, irradiation following operation did help ameliorate the condition, it prolonged life in one case. I am of the opinion that as in ovarian carcinoma, preoperative irradiation would be of great benefit in limiting the extent of the disease.

DR. DOUGAL BISSELL presented **Observation on the Menstrual Cyclical Pelvic Fluid.** (For original article see page 271.)

DR. LOUIS E. PHANEUF (by invitation) read a paper entitled **Radium Therapy in Uterine Hemorrhages of Benign Origin.** (For original article see page 225.)

DISCUSSION

DR. GEORGE G. WARD.—I have looked over the records at the Woman's Hospital and found in the past five years 309 cases of the type discussed. Of great

interest in these cases is the treatment by radium of the young girl who bleeds excessively. In my series I had four cases under twenty years of age. One girl, nineteen years old, had been having an excessive flow at each period, with marked anemia as a result, for about two years. Repeated curettages were without avail and, therefore, we subjected her to radiation. She was given 300 mg. hours with satisfactory result, menstruating normally. The second case was seventeen years of age, also had had repeated curettages. She was given 250 mg. hours with a partial result. I might say here that in young girls we use a very small dose of radium with the understanding that we may have to repeat it. If you use as much as 500 or 600 mg. hours, permanent amenorrheas may result. We, therefore, underradiate in young women even though it may be necessary to repeat the dose later on. The third case was twenty years old and she was given 200 mg. hours with satisfactory results. We saw her two years later and her periods were absolutely normal. The fourth case was sixteen years of age. She had been having a profuse flow and had been curetted without result. Three hundred mg. hours were given her with satisfactory result. That patient was seen two years later.

As an example of overirradiation I would like to mention the case of a young lady, twenty-four years of age, prominent socially, who had a similar history. She was given 1440 mg. hours by a well known radiologist, two years ago, and has now a permanent atrophy with amenorrhea. I mention this to show what a very dangerous weapon radium is if it is not used properly.

To show how variable radiation is I would like to mention a case which is rather extraordinary in my experience. The patient, a colored girl, was admitted to the Woman's Hospital May 3, 1925. She was twenty years old and had been married eight months. She gave a history of severe hemorrhages, was suffering from extreme anemia and had been transfused. A dilatation and curettage was done. The pathologic report showed placental tissue. She evidently had been pregnant and miscarried. The pathologist added that there was strong evidence pointing to chorionepithelioma. On May 12 she was given 101 mg. of radium in tandem form for twenty hours. She was again transfused May 12 and May 19. Her hemoglobin was 41 per cent and the red cells were 3,080,000. She was discharged June 5, 1925. We saw her the following month, she was apparently all right and had stopped bleeding. She had no menstruation for five months following radiation, then menstruated regularly, flowing for about two to three days, until May, 1927, when she became pregnant. She had a normal labor in February, 1928, in the Woman's Hospital. The baby weighed 6½ pounds, perfectly healthy and well-formed. Since that time she has been pregnant twice and has miscarried each time. It is extraordinary that after a radiation of 2000 mg. hours and menstruation being stopped for five months that the patient subsequently had a normal child. Her following pregnancy dated from July, 1928. She was readmitted to the hospital October, 1928, with a history of a profuse flow. Examination at this time showed the uterus enlarged to the size of a six weeks' pregnancy. A diagnosis of incomplete abortion was made and she was curetted. Pathologic report showed placental tissue. Her periods then continued normal until the time of her last pregnancy, for which she was again admitted to the hospital in October, 1929, with a history of having been pregnant since the previous May. At this admission a diagnosis of abortion was made, but no operation was performed, and this time she had a macerated fetus. Since then she has menstruated regularly, every four weeks, flowing for three days. No attempt at induction was made in either abortion.

I think a great deal of success in this type of case depends on the technic used. We use two tubes of radium of 50 mg. each, in tandem form, in a brass capsule covered with rubber, so that the entire cavity of the uterus is radiated from the fundus down to the cervix, and we think a very important part of the technic is that the radium when it is placed in the uterus should be anchored there. I am sure

that some of the results which have not been satisfactory are due to the fact that the radium has not been fastened in situ. We anchor it with a silk thread attached to the tube and to a needle, which is passed and held taut by the assistant while the vagina is packed with gauze. It is then sutured to the perineum and tied. When removed, the interne cuts the knot at the vulva and withdraws the gauze and the attached radium.

We have an electroscope in the operating room with which we test the radium, thus proving its presence in the container. We think the packing with gauze is important. The vagina should be distended to the utmost so as to push the bladder and rectum as far away from the radium as possible and thus get the value of distance screening with much less irritation of the bladder and rectum. The use of the self-retaining catheter is most important.

I think the gynecologist should know how to use radium. It is very true that radiologists are necessary for their part of the work, but we certainly feel that it is the clinician's job to know how to use radium, and he should be familiar with its dangers as well as with its advantages.

DR. HOWARD C. TAYLOR.—The limitation placed by Dr. Phaneuf upon the size of fibroids suitable for the use of radium seems to me a very proper one, for tumors larger than the uterus of a three months' pregnancy, as well as pedunculated and submucous tumors are not well controlled by radium.

The use of radium in young girls seems to me a dangerous procedure both from the possible effects on the endometrium as well as from that of a permanent damage to the ovaries themselves. If radium is employed in such patients, it must be only as a last resort and should certainly be administered in the manner outlined by Dr. Ward, in very small doses repeated if necessary.

The dosage for fibroid of the uterus apparently employed by Dr. Phaneuf was in some cases as much as 1800 mg. hours. This is nearly twice the amount I ordinarily use and, I believe, much more than is necessary.

Dr. Phaneuf spoke also of allowing his patients out of bed a day after radium has been used. Those of you who have performed hysterectomy for cervical cancer a few days after the use of preoperative radium will remember the engorged, edematous condition of the peritoneum at that time. There is no doubt that a similar reaction takes place in the peritoneum after the use of radium for fibroids or for menopausal bleeding and for that reason it is better for the patients to remain in bed for several days after the use of radium until the reaction has at least partly subsided.

In particular I wish to emphasize a point brought out by Dr. Ward that it is no longer possible to do proper gynecology without radium at hand. The technic of its use is simple, is rapidly becoming standardized and is easily learned. Large quantities of radium are not necessary for although we possess 140 mg. at the Roosevelt Hospital, we rarely use more than 100 mg. at a time. The initial expense is not great and will prove a good investment to the hospital and a saver of time to physician and patient. The time to decide whether radium is indicated is not in the office but in the operating room after the curettage has shown the condition of the endometrial cavity. For this reason the plan of renting radium in advance for certain cases will not permit flexibility of judgment and will not tend to the best results. For the same reason the sending of cases picked preoperatively as favorable for radium to special radium institutions is not based on practical considerations.

DR. WILLIAM P. HEALY.—It is interesting that Dr. Phaneuf had so few fibromyomas for treatment by radiation therapy and such a large number of benign bleeding cases in middle life. I do not just recall the age limit he set for middle life or whether he mentioned it, but my reaction to the dosage used was similar to that of Dr. Taylor; that is, that it was probably much greater than would really be

found necessary to bring about cessation of bleeding, and in middle life of women, say from thirty-five to forty-five, certainly a large number of those women would be better off if they did not lose their menstrual cycle. I am not at all convinced from personal observation, that an artificial menopause is a happy experience for the average woman. As a matter of fact most of them complain bitterly about it. Therefore, I think we should attempt something better because we can do better with radiation therapy in the absence of tumors. I would like to encourage the use of smaller doses of radium in instances of uterine bleeding of benign origin in women in middle life not associated with tumors. In the presence of fibroid tumors I think you can also obtain good results in uteri in which the tumors are not larger than a three months' gestation. I believe radium should be used in a dose that will not exceed in tandem form 600 or 700 mg. hours with each capsule. I feel it is rather undesirable to use more than 600 or 700 mg. hours with each capsule in benign conditions, because you can very easily obtain ulceration of the uterine wall, and that will produce persistent leucorrhea and pain, cramplike pain that makes the patient quite unhappy.

I also agree entirely with Dr. Ward and Dr. Taylor in regard to the young woman at the time of puberty or up to the age of twenty years. I hesitate a long time before using radiation therapy in those cases. We resort to all possible methods of medical therapy before resorting to radiation therapy because as a matter of fact we seldom find any pathology in these uteri. Curettage does not give us any information that is of special value, and exploratory celiotomy does not reveal any abnormality. We have done exploratory celiotomy in some of these cases with the idea that there might be some pathology in the ovary, that the capsule of the ovary seemed hard and thick. Finally, when we felt it was necessary to use radium we kept the dose down to 300 mg. hours. We have not exceeded that as our primary dose in any of these young women. Of course, if you only use that dosage it will be weeks or several months before you can obtain the histologic change that goes with the use of radium. If the patient has menorrhagia in the first, second or third period after treatment, you must not think you have failed and give immediately another dose of radium because then you are going to get a cumulative effect and instead of getting 300 mg. hours you get 600 mg. hours, or its effect, if you give 300 mg. hours each time. Six hundred milligram hours is altogether too much to use, we believe, in any young woman under eighteen or twenty years of age, at least six months' time should elapse between the first 200 or 300 mg. hours and a repetition of that treatment.

DR. J. A. CORSCADEN.—I suppose it would be a startling statement to assert that this is a much more important subject than cancer of the uterus, but the mortality statistics in the registration area show that nearly two to three times as many women die from benign tumor as from carcinoma because of the frequency of the disease. From the standpoint of sickness we find that the large employer of women in clerical jobs takes cognizance of menstrual disorders, and it is the common practice to give women one day a month off from work without reference to sick leave or vacation, which means about a 5 per cent loss which is, nowadays at any rate, quite a lot of interest. So I think the details of this treatment, this question of dosage, which has received so much discussion, is of great importance. I would agree with Dr. Phaneuf on the dosage. We have an interesting series of follow-up results. In the women who received 1200 hours the bleeding was controlled in 85 per cent of the cases, whereas in the cases where 1800 mg. were given it was controlled in 97 per cent of the cases. That is to say of the 1200 mg. cases 1 in 7 or 8 required subsequent treatment of some kind or other for the bleeding itself.

In regard to menopause symptoms: in our cancer clinic we have made an observation which is at present only an impression which I hope to be able to record more

accurately later on, that women who receive 6000 to 8000 mg. hours of radium have less menopausal symptoms than those who get only 1500 or 1600.

In some women around 40 years of age at present we are not only giving 1800 but 2400 to 3000 mg. hours filtered with a millimeter of platinum. We feel justified in that by our observations on our cancer cases, whether they are true or false.

In regard to the use of radium in older women: we have been very apprehensive about applying radium to older women, because we have been impressed with the association (it may be remote) between the hyperplasia coming on after the menopause and carcinoma. In women in perfect health sixty years old who are bleeding, even without a definite diagnosis of adenocarcinoma, we would be inclined to do a hysterectomy rather than apply radium.

I have two very interesting benign cases. One of them had a bilateral salpingo-oophorectomy at forty-seven. At the age of seventy-three she suffered from periodic hemorrhages every two or three months. An attempt had been made to remove the uterus because of a suspected carcinoma. She was referred to us for palliative treatment, dilatation and curettage revealed a luxuriant hyperplasia. We put in 1800 mg. hours of radium with no effect on the bleeding whatsoever. She is now eighty-four years old. She goes on bleeding every two or three months and is in perfect health as far as her pelvic organs are concerned. I simply cite that as one of the odd cases of uterine hemorrhage which may have a local cause. At any rate, we think that the use of radium therapy for hemorrhages following the menopause is likely to be followed years later by trouble.

DR. WALTER T. DANNREUTHER.—I cannot agree that it is necessary to use radium at all for menorrhagias of adolescence. I was surprised that Dr. Phaneuf did not mention the associated endocrine and constitutional disturbances, which are so important in these cases. I have had a number of young patients with profuse bleeding and have been impressed by the manifestations of thyroid dysfunction in a large proportion of them. As a general rule, it is one of the first things noted, and is more often a hypo- rather than a hyperthyroidism. Knowing the reciprocal cooperation and influence of the pituitary, thyroid and ovary in the promotion and control of menstruation, I do not think it strange that endocrine imbalance is often found to be a causative factor. Sometime ago I developed a routine of treatment which has served me in such good stead that in no single instance have I failed to arrest the abnormal bleeding. Usually by the time the patient comes under observation she is somewhat exsanguinated, and has a secondary anemia, a hemoglobin of 25 to 50 per cent, a low red cell count, persistent bleeding, and a distracted family. It is desirable to have a basal metabolism test done, as this, together with a survey of the patient's physical characteristics and history, enable one to form a definite idea of her endocrine status. She is then given a transfusion of 300 c.c. of blood. Calcium is administered by mouth and sometimes intravenously. Soon thereafter the patient is referred for x-ray of the spleen, never the plevis. At the Post-Graduate Hospital we give approximately one-quarter of a skin erythema dose, repeated at three or four week intervals. Hypodermic injections of iron arsenite and strychnine and a high calorie diet, with appropriate organotherapy are valuable adjuncts. Two or three transfusions, two or three or four applications of x-ray to the spleen, and general constitutional measures, plus organotherapy, have eventuated in a satisfactory result without exception. Such a case was a girl of fourteen with persistent bleeding for six weeks before admission and hemoglobin of 25 per cent. She was treated in accordance with the suggestions outlined and her bleeding was entirely controlled in about three weeks. A diagnosis of hypothyroidism could almost be made by placing the hand on the patient's abdomen, as the skin was like parchment. Once such a clue presents itself, one has only to look for additional evidence. In such a case, if the patient has falling hair, a slow pulse, is mentally sluggish, is sleepy dur-

ing the day, and has other symptoms pointing to hypothyroidism, the diagnosis is established.

It is well to emphasize the desirability of being patient in evaluating the end-results after radium therapy in benign cases, in both the younger and older women. It is advisable to caution the patient in advance, that the permanent effects of the radiation may not be established for three to six months, and that a transitory leucorrhea often follows the irradiation. This is sometimes quite irritating, unless an alkaline douche is taken daily.

DR. IRA I. KAPLAN.—In a free hospital such as Bellevue irradiation therapy is mostly used for malignancy. Occasionally benign conditions are referred for treatment but most of these have been treated unsuccessfully elsewhere and are then sent to the gynecologic service at Bellevue for whatever saving methods we may be able to apply. Most of these cases have been curetted a great many times and for that reason irradiation with radium acts so well in small doses and, in as much as a great deal of the endometrium has already been destroyed, there is very little left to take care of with the radium because most of the capillary tissue is gone.

If radium is used it is important to place it in the whole uterine cavity. In our experience with radiation therapy, we have found that the treatment of uterine bleeding can be well carried on without packing radium into the uterus, and in the case of young women, why should we destroy an active uterine endometrium? If we believe that uterine bleeding is in most part an ovarian function and in part and endocrine function, why not control this bleeding in some manner without destroying the endometrium of the uterus which, especially in the case of young people may be required later on. In the exceptional case pregnancy may occur after radium; the usual case with a destroyed endomentrium seldom becomes pregnant.

I agree with Healy, that early menopause is not a pleasant thing for women. You can avoid that. In our cases, of which we have had several hundred, we have found that the women under fifty cannot always be castrated with the x-ray and women under twenty castrating is never permanent, and occasionally definite in women between thirty and fifty. In cases over fifty, x-ray castration always occurs. In girls of thirteen we would not think of using radium. In such cases we feel that there is a functional disturbance which may be corrected by treatment over the spleen. We always try the spleen first, and then the pituitary.

I am quite in accord with Dr. Phaneuf on the amount of dosage that he uses, especially in the older patients. Not every pathologic specimen is going to show you the true history of the case. Time and again even though the biopsy was reported as nonmalignant, the clinical course of the case proved the lesion was malignant. One of the most peculiar conditions is as Dr. Corscaden has remarked, that in older patients malignancy will hide itself under the old sclerotic covering of an ancient endometritis. Therefore I think we are much safer in using a large dose of radium as Phaneuf does and for a time inhibit the extension of a probable malignancy even if it does not cure it entirely.

DR. HARVEY B. MATTHEWS.—Accurate diagnosis is one of the first and most important steps in the use of radium. We have seen a few cases in which radium was used where it was contraindicated; as for example in the presence of chronic inflammation with small adnexal masses or slight parametrial induration. These latter lesions may be overlooked when one is in a hurry due to stress of work or is careless in making pelvic examinations. There is no question but that radium does excite activity in these chronic pelvic inflammations.

Smaller doses given over a period of six months' time will give better results than one large dose such as Phaneuf has recommended. For the middle-aged or older lady 1200 to 1500 mg. hours is usually what we give, sometimes when pregnancy is to be considered 600 to 800 mg. hours, and repeated if and when necessary.

In regard to the dosage in young women: we start with 200, 300, or 400 mg. hours, and in the young woman under twenty years we prefer to use one, two, or even three small doses.

From our laboratory experiments in rabbits, where we radiated the ovary up to 800 mg. hours in one dose; or 800 mg. hours in two doses over a period of four months, we are convinced that such dosage is perfectly safe as far as pregnancy is concerned.

DR. WILLIAM S. SMITH.—I am very much interested in the group of cases that the doctor reports, because we have a similar group of cases in our series at the Brooklyn Hospital. We have 111 metritis cases, all of which were over forty years of age. We have 34 cases of fibroids. In the beginning our dosage was 1200 mg. hours, but as there were five women who began to flow again, we gradually increased the dosage to 1800 mg. hours, and now the majority of metritis patients are given 2400 mg. hours. We screen our radium with one full millimeter of platinum. With heavy screening and large doses we have had little or no trouble from leucorrhea. We have had no trouble whatsoever in these 111 cases of chronic metritis from irritation of the bladder or rectum.

We do not use a self-retaining catheter, and have never had any difficulty from a distended bladder. If the patient cannot void she is catheterized, and with the radium heavily screened we do not fear irritation of the bladder. We use the radium in two capsules, each of which contains 50 mg. We fasten the capsules in tandem within a rubber tube and place it high up in the uterine cavity. We pack the cervix with a narrow strip of plain gauze, in addition to firmly packing the vagina.

We have had 15 cases in this series of 111, in which there have been various surgical operations, such as amputation of the cervix, trachelorrhaphy, anterior colporrhaphy, and perineorrhaphy. In these cases we do not pack the cervix or the vagina, but suture the rubber tube into one lip of the cervix with a long piece of catgut. The suture is tied in a single bow knot, and the long end is left outside the vagina. In this way we are sure that the radium remains where it is placed, and in addition, it is very easy to remove the suture and the radium. Our surgical results in this group of cases have been uniformly good.

DR. T. C. PEIGHTAL.—At the Roosevelt Hospital we have had approximately 600 cases where we used radiation for benign fibroids and idiopathic bleeding. In our series there were about 55 per cent of fibroids and 45 per cent of idiopathic bleeding.

For fibroids in general we have found that roughly only about 10 per cent of them were suitable for radiation. Of the other 90 per cent approximately 65 per cent had some type of hysterectomy; while in the other 35 per cent menstrual function could be maintained by myomectomy or partial hysterectomy. For cases of idiopathic bleeding in general we found that 65 per cent needed only curettage; and about 35 per cent of this group were radiated.

In regard to the technic of radiation we use either 50 mg. in one capsule or two 25 mg. doses in tandem, or if the cavity is long enough one can even use 50 and two 25. In other words, we vary the capsules of radium according to the size of the uterine cavity. I think that is an important point to bring out. The radium is placed in special rubber tubing free from metallic content and this tubing is held in place by a suture through the lips of the cervix. As all the radium is well up in the fundus, we do not pack the vagina and, therefore, practically all of these patients void, and the very few who do not are catheterized. I know of no cases of bladder or rectal complications from this procedure.

We started in 1917 with a dosage of 500 mg. hours, even in fibroids. This was gradually worked up to about 1500, and now it has gone down the scale again, until today, in fibroids that are suitable for radiation about 700 to 900 mg. hours is all

that is used. In other words, after experience with higher dosages we believe just as efficient results can be obtained with the lower ones.

DR. LOUIS E. PHANEUF.—Dr. Ward's greater experience than mine, 309 cases, bears out a number of points which I have mentioned. He uses smaller dosage than I have employed in the very young woman, I will be guided by this in the future. If, however, the hormones of the anterior pituitary body and of the ovary come up to our expectations we may find a new solution to these cases which will make radiation unnecessary. Ward advocates the use of the self-retaining catheter as I do, and feels that it is safer to keep the bladder flat and absolutely empty. Distention of the vagina, with gauze, I have practiced in this series of cases as he has described.

Dr. Healy claimed that I had used doses larger than might be necessary. I have felt my way with these cases, and, like Drs. Corscaden and Smith, have found that after a 1200 mg. hour dose occasionally I met repeated bleeding which was very distressing to the patient. I have crept up to 1800 mg. hours, but, like Peightal, I am getting back to a smaller dose as time goes on.

In answer to Dr. Corscaden I would say that 11 different types of operations were performed on 44 women in conjunction with the insertion of radium, curettage, amputation of the cervix, perineorrhaphy, etc. These operations have given me satisfactory results in all cases. I have not found any difficulties following them nor have I found any secondary hemorrhages. Therefore, I would not hesitate to amputate the cervix when necessary.

I agree with what Dr. Corscaden said in regard to older women; hysterectomy is preferable to radium. I usually do a vaginal hysterectomy in these older women to get rid of the bleeding uterus. In some of the cases I had, there were constitutional contraindications to hysterectomy. I felt that radium was safer than vaginal hysterectomy even though that procedure is attended by very little shock.

Dr. Taylor has emphasized the danger of using radium in young girls and also the smaller dosage, which is in keeping with the general trend of the discussion. Like Dr. Ward he advises 300 or 250 mg. hours. My impression was from Dr. Matthew's first article he had published on the subject that he had found a dose up to 800 mg. hours to be within safe limits. The tendency today is to give smaller doses.

Like Dr. Dannreuther I feel that young women with irregularities of menstruation should be studied medically and endocrinologically. We have, in our hospital, a man who is especially interested in endocrinology who studies these cases as completely as possible. In those which I have reported all the tests mentioned including basal metabolism had been carried out. Treatment along these lines had been administered without success and when the bleeding became alarming radiation was resorted to.

I have had but one experience with x-ray application over the spleen. I was not able to follow the results as this patient had a hysterectomy done by another surgeon.

OBSTETRICAL SOCIETY OF PHILADELPHIA

MEETING OF DECEMBER 3, 1931

DR. JAMES P. LEWIS reported a case of **Cornual Pregnancy.**

The classification of the type of extrauterine gestation found at operation or autopsy is not always a simple procedure. This case clinically shows many features of a cornual type, but the autopsy findings rather suggest a well advanced tubal pregnancy.

The patient I. A., para ii, aged twenty-one, colored, was admitted to the service of Dr. Philip Williams at the Philadelphia General Hospital, July 8, 1931. Her chief complaint was pain in the lower abdomen. Her last menstrual period was on March 16, 1931. Ever since she had stopped menstruating she had continuous pain in her lower abdomen, not severe enough to put her to bed. On July 5 patient had a sharp lancinating pain in the left lower quadrant of the abdomen so severe as to make her feel weak and cause her to go to bed for that day. On July 8 she had a similar attack of very severe pain, and she was sent to the hospital.

On admission to the hospital the patient was *in extremis*. Temperature 97°, pulse 140, respirations 40. She was markedly anemic and in shock. Pelvic examination revealed a multiparous outlet but with good support. There was no vaginal bleeding. The cervix was slightly softened. The uterus seemed uniformly enlarged to the size of a four months' pregnancy. The body of the uterus could be felt 2 fingers-breadth below the umbilicus. There was tenderness over the body of the uterus and some tenderness on motion of the cervix. There was no tenderness in the adnexal regions nor were any lateral masses palpable.

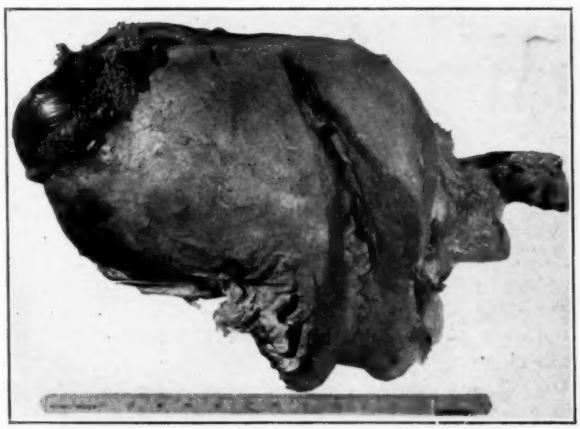

Fig. 1

Inasmuch as the size of the uterus corresponded to the period of amenorrhea and there were no masses in the adnexal region, rupture of an ordinary tubal pregnancy seemed unlikely, and a tentative diagnosis of ruptured uterus and probable cornual pregnancy was made. The patient's condition made hysterectomy impossible. Notwithstanding active and vigorous treatment she died within two hours after admission.

Autopsy revealed the peritoneal cavity markedly distended by free and clotted blood which displaced the diaphragm upwards. The cervix uteri was enlarged and soft. The uterine cavity itself was but little enlarged. At the extreme upper and outer left corner of the uterus was a large sac whose covering was continuous with that of the uterus. It contained a fetus of about three months' development. The amnion was intact, holding the amniotic fluid. The surrounding membranes were ruptured leaving a markedly bloody surface. The ovary of the left side was not found. The right tube was of small caliber and would not allow a probe to pass through its lumen. The right ovary was normal.

Fig. 1 illustrates the findings much better than the pathologist's description. Grossly and clinically this appears to be a case of cornual pregnancy, but it lacks

certain criteria. The left tube was not identified outside the gestation sac. Whether the sac which is continuous with the uterus is an enormously enlarged tube which ruptured at the fimbriated extremity must still be decided.

Dr. W. B. Harer presented a paper entitled **A Study of Fetal Mortality.** (For original article see page 254.)

DISCUSSION

DR. E. B. PIPER.—The high mortality shown on some of these charts was sometimes largely a question of knowing the child was lost on admission, and too late for a cesarean section safely. Therefore they were treated as seemed best in the eyes of the individual doctor. We do not believe there is any routine way.

As for the statements made about out-door obstetric services, I desire to state that the fourth-year medical student of today is a great deal better prepared to take care of obstetric cases in private homes than were many of the older men when they received their degree in medicine. The fourth-year medical student is trained to be able to diagnose and send in bad cases. In a series of four thousand and some hundred cases in the Southeastern Dispensary of Philadelphia, the mortality of the cases handled by students was 2.2 per cent.

DR. WILLIAM R. NICHOLSON.—I am thoroughly in favor of the statement made regarding the use of forceps in the after-coming head cases. I think there is no doubt that infant death rate is very much reduced by forceps delivery.

Dr. John A. McGlinn read a paper entitled **Reconstruction of the Urethra.** (For original article see page 262.)

DISCUSSION

DR. EDWARD A. SCHUMANN.—Cases of reconstruction of the urethra may be divided into two groups. One group includes the fundamental cases, the other those of traumatic origin.

The first group, of hypospadias cases, are always connected with an insufficient blood supply, and in them reconstruction is much more difficult because of the danger of anemic tissues breaking down.

The second group offer an almost equally strong objection to closure, in that most of them have suffered so many attempts at repair, and the vagina has been reduced to a mass of fibrous tissue.

In one case in which I attempted the Ward technic with a reasonable degree of success, the bladder fistula was so large that I felt I could not get a wide enough flap of tissue to close it. I therefore made a successful attempt to reduce the size of the bladder tissue, and this method has now become habitual with me.

DR. F. H. MAIER.—It has been our practice to correct through the suprapubic Pfannenstiel incision urinary fistulae which were difficult of correction through the vagina and which had been unsuccessfully operated upon before.

DR. J. H. GIRVIN.—I have recently had two reconstructions of the urethra and had rather unfortunate results in both cases. The first I have operated upon at least fifteen or sixteen times. We gradually closed the opening of the bladder, and then reconstructed the urethra, but of course with no muscular control. This looked so favorable that I determined I would bury some muscle fiber around the urethra. I used fibers of the levator ani muscle, and got a very successful result; but she left the hospital with a rectovaginal fistula which I have not yet been able to close.

The other case was a comparatively large vesicovaginal fistula, in which I had a very successful result with the first operation. She came back with a very small opening not much larger than the point of a pencil. Following the attempt to close that, the whole of the lower half of her urethra sloughed away, and I have done at least eighteen other operations in the attempt to correct this condition.

I think one important factor is not to use absorbable sutures. I got much better results from using a very thin silkworm gut.

DR. LEONARD AVERETT.—I was called in consultation to a patient who had been in labor for forty-eight hours with a contracted pelvis making vaginal delivery impossible. I performed a cesarean section and five days later patient began to dribble urine from the vagina. Upon examination, I found the anterior portion of the cervix sloughed away and a hole in the posterior wall of the bladder just above the trigone. This was due to a pressure necrosis as result of the prolonged labor.

The patient made an uneventful recovery and returned seven months later for repair of the vesicovaginal fistula. After repair of the bladder, a self-retaining catheter was inserted for continuous bladder drainage. A week later the incision broke down and she again began to dribble urine from the vagina. When she was discharged from the hospital she was advised to return in four months for another operation. A month later she presented herself at my office for examination and I found the fistula entirely healed.

DR. F. H. MAIER AND DR. W. J. THUDIUM presented a paper entitled **The Fothergill Operation.** (For original article see page 248.)

DISCUSSION

DR. JOHN M. FISHER.—It appears to me that the Fothergill operation is founded upon correct anatomic and physiologic principles. As I have seen it done by Dr. Maier it apparently meets the indications referred to in a very large proportion of cases. Nevertheless, in the absence of more enlightenment on the subject I should hesitate to accept it as a standardized procedure for all cases of uterine prolapse.

Dr. Maier claims that the more pronounced the prolapse the greater the adaptability of the operation to the condition. I should like to see him operate on a case of procidentia with a complete inversion of the vagina and note the result six months later.

DR. GEORGE OUTERBRIDGE.—I should like to ask Dr. Maier just what the result after this operation is with regard to the cystocele that usually accompanies prolapse? I could not see from his description that anything was done to correct it, and my feeling was that, just as has been stated by Dr. Hirst, it would be apt to give trouble.

DR. GEORGE LAWS.—In England the conception of the mechanism of genital support is different in that it is believed to depend almost wholly upon the connective tissue sheaths of the blood vessels.

I have done two or three of these operations with success, but felt that it was contrary to the best teaching, though the simplicity of the procedure commends it.

DR. JOHN A. MCGLINN.—I am in thorough accord with everything that Doctor Maier has said, except to speak of the Fothergill operation as a standardized operation for prolapse of the uterus. I do not believe you can have such a thing as a standardized operation. The surgeon must be prepared to meet the various conditions and complications that are present in prolapse of the uterus. There is no

doubt that this operation does cure prolapse. It is easy of execution and I have done it successfully under local anesthesia.

There are cases of prolapse, however, in which it would be a serious error to leave the uterus behind. A uterus that is in any way suspicious, particularly after the menopause, should be removed.

DR. LEONARD AVERETT.—I have performed the Fothergill operation twice. The results were very good in both cases and I am very much impressed with this operation. In both cases, I had a large cystocele to deal with and after dissecting the bladder from the cervix, I anchored it higher up, which I believe differs from the original technic.

DR. MAIER (Closing).—Any one familiar with the technic and the results of the Fothergill operation cannot help but be impressed with its superiority over all other methods for the cure of uterine prolapse.

It eliminates the opening of the abdominal cavity with its attendant percentage of mortality and morbidity and prolonged convalescence. Unlike the interposition operation it is applicable to women of all ages, as the retention of a three-inch uterus permits childbirth.

Diagnostic curettage is performed routinely. We believe that correction of the cystocele can always be accomplished by removing a sufficiently large triangle or quadrangle of vaginal wall. In some cases of elongated cervices in women beyond the menopause we push the bladder well up off of the cervix and amputate as high up as possible.

In answer to the question of how deep we introduce our needle into the para-colpo-metrial tissue: we go through the vaginal walls only. The closure of the wound brings and holds the tissues in front of the cervix. The cervix is thereby pushed upward and backward into the hollow of the sacrum, leaving the uterus in the much desired position of anteversion.

DR. JOHN C. HIRST reported a case of **Microcephaly**.

This example of a microcephalic newborn infant is presented because unusual familial circumstances offer favorable opportunity for discussion as to the causative factors and mode of development involved.

This abnormal infant was born to Mrs. E. A. in the obstetric service of the Burlington County Hospital, Mount Holly, N. J., July 3, 1931. Patient was white, aged twenty-six, one of twenty brothers and sisters, twelve of whom are living, but all feebleminded. The father, one of seven children, only two surviving, orphaned at two years of age, was "raised" by an aunt who later became insane. Living a primitive life in the New Jersey wilds, the parents, working only when forced, typify certain of the "Pineys," namely, those astounding half-wild illiterates to be found near by in the bogs and pines of New Jersey, who if, as many believe, originated as refugees from stringent religious law of fine Quaker stock, certainly show no present resemblance to their forebears. The father particularly suggests the degenerate, whose main emotion being one of sex, becomes aroused even by lower animals.

Mrs. E. A.'s history is featured by very short, scant, but regular and painless menses, no miscarriages, six prior births, the last three with transverse presentation and prolapsed arm, only one surviving.

Physical examination revealed nothing unusual as of time of this birth for which the patient was admitted in labor, membranes intact, rectocele and cystocele, no obstruction yet floating head in the iliac fossa, for which version and extraction were performed without complication.

Fig. 1

Fig. 2

The female infant, length 46 cm., well developed mature body, weight 6¼ pounds presented an obviously small cranium, small fontanelles, cranial bones firmly united at prominent sutures and a startling appearance mainly due to mature facial expression with prominent active eyes and lids resembling somewhat the frog facies of anencephalus.

HEAD MEASUREMENTS

		WHITES-NORMAL
Occipitofrontal	9 cm.	(11.75)
Biparietal	7 cm.	(9.25)
Bitemporal	5 cm.	(8.0)
Occipitomental	10½ cm.	(13.33)
Suboccipitobregmatic	7½ cm.	(9.7)
Circumference	22 cm.	(34.50)
(Chest Circumference)	27.9 cm.	(33.25)

X-ray examination revealed no skeletal abnormality, but a brachycephalic type of moderate microcephalus with very poor development in the region of the occiput and foramen magnum.

A negative Wassermann was found in child and mother. Decidedly peculiar actions and increasingly unusual appearance strongly suggested idiocy; poor nursing; weaning and unsatisfactory weight. At the age of five weeks, following discharge from the Maternity, the infant was readmitted to the pediatric service for vomiting and extreme emaciation, when the disproportionally small cranium was again more striking than the diameters indicated, and probably the underlying cause of death on August 31, 1931. No postmortem examination.

My review of more than twenty thousand consecutive birth records from the Southeastern Dispensary Out Service of the University of Pennsylvania Department of Obstetrics, shows that hydrocephalus unlike hemicephalus, affected the colored infants more often than white, distributed equally between male and female newborn, so that it is more than likely that relative hydrocephalus has nothing to do with microcephaly and even hemicrania, especially since in the above series only white infants (mostly female) showed the latter anomaly.

The only treatment of microcephaly available is based on a theory of unyielding sutures and poorly developing skull bones, namely excision of cranial bony strips, which as far as known (Birnbaum) has been ineffectual.

Department of Reviews and Abstracts

CONDUCTED BY HUGO EHRENFEST, M.D., ASSOCIATE EDITOR

Collective Review

A Critical Review of the Gynecologic Literature of 1931

JULIUS E. LACKNER, M.D., AND SYDNEY S. SCHOCHET, M.D., CHICAGO

INTRODUCTION

THERE is a general law that progress in any direction is characterized by specialization. This is brilliantly exemplified in the specialty of gynecology. During its early history we note the remarkable development of operative procedures which general surgery perhaps never would have accomplished. Following this period there came a narrow and ineffective study of gynecologic diseases based on the morphologic pathology of the pelvic structures with its attendant classification of endometrial lesions as hyperplastic and hypoplastic endometritis et cetera. Finally it became apparent that the correct interpretation of the many gynecic problems must be based on physiologic processes and their interrelationship with other organs and the ductless glands rather than on histologic changes in the reproductive system. Physiologic studies and this most recent attitude toward gynecology are the outstanding topics of the gynecologic literature of 1931.

GENERAL PROBLEMS

Gynecology is becoming less and less a purely surgical specialty. Emil Novak[1] reviews the development of gynecology and rightly emphasizes the necessity of a thorough knowledge of the physiology and pathology of the reproductive apparatus in clinical studies. In an analysis of the biologic significance of the female reproductive cycle he emphasizes the phenomena of periodicity as exhibited in the functions of the female reproductive organs. Periodicity may be said to be a rule of the universe. Graves[2] maintains that the ultimate goal of pure science is the complete unification of all the laws of nature into a single principle which shall explain the phenomena both of living and nonliving matter. The goal of applied science is to utilize the knowledge thus gained in ways that may benefit the human race.

Every gynecologist should be trained in pathology or at least have a comprehensive knowledge of gross pathology. In all but the most exceptional hospitals the surgeon must depend upon the pathologist and accept his decision for the course of operative procedure. This interdependence of the pathologist and surgeon is presented in a most forceful editorial by Maes.[3] (In our experience we have not always found the general pathologist sufficiently trained and versed in gynecic pathology.)

Not infrequently patients with faulty calcium metabolism and abdominal spasmophilia are subjected to abdominal operations though they only needed an increase of the blood calcium.[4]

A most instructive and valuable contribution on the effect of intravenous glucose on cardio-vascular apparatus and cellular contents of the blood is presented by the late John O. Polak.[5, 6] Nafe[7] outlines the more common causes of postoperative complications of abdominal operations and the methods of treatment.

Since Cullen's first report of postoperative gangrenous ulcer of the abdominal wall fifteen others have been recorded in the literature. Lynn[8] is of the opinion that this pathologic process occurs even more frequently than would appear from the literature. The gangrenous process usually begins a week or two after the operation; the specific etiologic factor has not been isolated; and the ordinary germicides and antiseptics are not effective in checking this condition. The use of the cautery gives the most prompt and encouraging results. Hypertonic solutions of sodium chloride appear to be effective.

Schmidt[9] reports that in the women's clinic of the University of Breslau out of a total of 6,114 gynecologic operations, 134 (2.19 per cent) developed thrombosis, and 26 (0.42 per cent) died of pulmonary embolism. Chalier[10] believes that phlebitis after gynecologic operations is usually aseptic, and that the suppurative lesions such as pyosalpinx give the veins an immunity through autovaccination. (This view is borne out by clinical evidence.)

Masson[11] reports on 313 operations for low median incisional hernias at the Mayo Clinic. The predisposing cause of hernia in many cases is a previously infected wound, but hernia may develop also without preceding infection. (In our service we prefer the routine Pfannenstiel incision which is the ideal prophylactic measure.)

The subject of anesthesia is discussed in more detail in another section of this review. Roeder[12] states that spinal anesthesia produces respiratory failure in two ways: a paralysis of the motor nerves of respiration and a paralysis of the vasomotor nerves of the splanchnic area, which cause a fall of bloodpressure followed by myocardial and medullary ischemia. A five or ten per cent by volume of carbon dioxide in pure oxygen is suggested as an adjunct when the motor nerves or the muscles of respiration are not paralyzed. (Our conception of anesthesia is that synthetic procain groups unite directly with the protoplasm of the cells and therefore are protoplasmic poisons.) In a discussion of narcotics in obstetrics and gynecology, De Lee[13] presents a very exact and detailed outline for the use of such drugs in postoperative conditions.

Dencks[14] suggests that the appendix be removed in all gynecologic operations, as it is often found to be the causative factor of dysmenorrhea. According to Howard Kelly[15] electro-surgery in gynecology has not received the attention this method deserves.

In a study of the positive Wassermann reaction in gynecologic surgery, Scheffey[16] finds that the incidence of syphilis in the operative cases as indicated by a positive test was 8.6 per cent.

In the entire range of subjective gynopathic manifestations, backache is one of the most familiar and least understood as to its nature, its direct cause, and the mechanism of its production. Sturmdorf[17] believes that gynopathic backache is a spastic backache, the gynopathic factor being one among many causes of myospastic pain in the lumbosacral area, and that this myospasm is a protective phenomenon. Like most other authors Young[18] attributes the low back pain to lumbosacral or sacroiliac strain. (We are of the opinion that many of these cases are due to pelvic congestion or pressure on the lumbosacral nerves with the resultant myospasm. Nevertheless we are not blind to the fact that a certain percentage of the cases must be attributed to the lumbosacral or sacroiliac joints.)

Templeton, Stein and Schochet have found that there are rhythmic contractions of the vagina and that an alteration in this physiologic function may be the cause of frigidity or dyspareunia. Leigner[19] believes that primary dyspareunia is due to a defect present in the genitals. (Physiologic studies do not confirm these views.)

It still is a moot question whether sex instructions should be imparted to children with the present overemphasis as advocated by many writers on this subject.[20, 21] Dickinson[22] is of the opinion that there should be schedules for sex education, for premarital medical instruction and texts on conjugal hygiene—as a program for preventative gynecology and protective medicine. (This contribution deserves careful study by gynecologists.)

In a somewhat revolutionary reclassification of pelvic lesions, Kisel[23] advocates a grouping based on "an absolute symptom complex" and claims that the laboratory is in a position to differentiate all diseases by this method. (We purposely mention this paper to show that there appears to exist a trend in medical thought and education of Russians which harmonizes with their social experiments.)

In a study of 1516 postnatal patients, Lash[24] finds that the symptoms of headaches, dizziness, and backache were the most common, and that these symptoms were often associated with retroversion. The author advocates the correction of the retroversion, and when this is associated with a relaxed perineum, he suggests a series of exercises, and massage for increasing the tone of the levator muscles.

Under proper conditions psychotherapy plays an important rôle in gynecology.[25, 26] Mayer[27] in a study of a series of cases from the gynecologic service of Mount Sinai Hospital presents conclusive evidence that such psychic investigations often clarified operative indications and eliminated almost entirely certain types of operation.

Each year many new laboratory tests are suggested to the gynecologist as aids to diagnosis and treatment. Molfatti[28] emphasizes the significance of calcium in the organism; Volter and Sharovskaya[29] discuss the important relations of lipase of the blood to infections; Hueper[30] et al. stress the value of the malignancy indices,

and the blood P_H values, and De Gaetani[31] writes of a method of inducing resistance against malignant tumors. All these suggestions may have real significance but in our present state of knowledge it is difficult to make a proper evaluation of these claims. Gay[32] presents a very interesting discussion on the subject of tissue resistance and immunity and attempts to correlate changed functional activity with structural alteration. Mullin and Large[33] see much value in studying the filament and nonfilament white cell count—a modification of Arneth's classification of polymorphonuclear blood cells. Mathieu[34] and Osgood[35] et al. have modified and improved the technic of the sedimentation test. (It is of special significance to one of us that trichomonas vaginalis vaginitis a type of specific infection does not alter the sedimentation time.)

ANESTHESIA

In most instances the anesthetic is as important as the operative procedure. Leaders in medicine and surgery rely upon the anesthetist to choose the method best suited to the individual case, to prevent accidents, and to insure the patient's recovery.[36]

Ether anesthesia is associated with hyperglycemia due to mobilization of the hepatic glycogen. According to Mekie[37] the action of ether is probably direct upon the liver cells. Pernocton injected intravenously may be used as the sole anesthetic or to reduce the amount of inhalation anesthesia. According to Brown, Moloy and Laird,[38] it does not cause excitation and post operative nausea is rare. Stander[39] favors avertin anesthesia in those cases in which general inhalation anesthesia is contraindicated and in which there is no evidence of disturbed hepatic or renal function. Avertin should not be given in amounts exceeding 100 mg. per kilogram of body weight. (From reported pharmacologic studies this compound of barbital should be employed with extreme caution.)

According to Falk[40] spinal anesthesia should not be used as a routine in all cases. It should be administered only by a trained anesthetist. Adams[41] found it a safe anesthetic in 88 to 98 per cent of his surgical cases. McKittrick, McClure and Sweet[42] from extensive observations at the Massachusetts General Hospital conclude that spinal anesthesia does not fulfill all the requirements essential to an ideal anesthetic for abdominal surgery, but that it has an important place in surgical work below the diaphragm. There was apparently an increase in the number of postoperative complications with spinal anesthesia. In elderly and debilitated cases this may be due to an increase in the incidence of atelectasis.

Stahnke[43] reports postoperative pulmonary complications in 14.2 per cent of gynecologic laparotomies under ether, and in 17.7 per cent under spinal anesthesia. Anderson[44] urges the necessity of better knowledge of how to combat the persistent headache and the fall in blood pressure subsequent to spinal anesthesia.

Burch and Harrison[45] have shown that the administration of ephedrin to dogs under spinal anesthesia decreased the susceptibility of such animals to hemorrhage, and caused a rise in the systolic pressure. The drop in blood pressure may be avoided by giving salt solution previous to the induction of the spinal anesthesia. Keyes and McLellan[46] claim that the advantages of nupercaine over procaine are greater than the disadvantages. Winograd and Rosenbloom[47] in a review of the literature on spinal anesthesia suggest the possibility of pathologic changes in the spinal cord caused by the anesthetic. Davis et al.[48] have found the following changes in the spinal cord of dogs after spinal anesthesia: (1) a varying degree of inflammatory reaction in the leptomeninges; (2) passive changes in the ganglion cells of the gray matter of the cord; (3) swelling and fragmentation of the axis cylinder; and (4) degenerative changes in the fiber tracts of the cord. The last three changes were not pronounced after ninety days. (This careful study should leave an indelible imprint on the mind of the student of spinal anesthesia.)

Bevan[49] can see no reason for the use of spinal anesthesia. He believes that it is more dangerous than chloroform, not always efficient, is not a comfortable method, does not eliminate psychic trauma, and causes aseptic meningitis. (We appreciate the limitations of spinal anesthesia, but do not concur in these sweeping statements. From our observations at the Michael Reese Hospital, we believe it to be the ideal anesthetic when used in properly selected cases and with proper technic.)

Deaths due to explosion of anesthetic mixtures have been given wide publicity in the lay press.[50] However, statistics show that it is the least of the hazards of anesthesia.

BREASTS

As in previous reviews we include a short résumé of lesions of the mammary glands as accessory glands to the organs of reproduction. Schochet, Lackner and Gustavson have shown that the female sex hormone is present in the blood of the newborn, and is the causative factor of mammary activity at birth through the blood stream.

Cutler[51] believes that painful breasts or mazoplasia is due to a certain type of desquamation of epithelial cells in the ducts and acini which is accompanied by hyperplasia of pericanalicular and periacinous connective tissue. Cutler is of the opinion that the syndrome of painful breasts is due to an overstimulation of the breast epithelium and connective tissue by the corpus luteum hormone, and that this condition is relieved by oral administration of dried ovarian residue from which the corpus luteum was removed. (In our experimental studies we have failed to observe physiologic results from the female sex hormone by oral administration.)

Seabold[52] concludes that the roentgenogram is a valuable adjunct in the diagnosis of lesions of the mammary gland.

Tuberculosis of the breast is a relatively rare condition when compared with the frequency of tuberculous infection in other organs of the human body. Morgen[53] reports that tuberculosis of the breast occurred in 0.51 per cent of all mammary conditions that were admitted to the hospital at the Mayo Clinic.

In a study of 1347 cases of malignant tumors of the breast, Crile[54] states that the average natural duration of life for a patient with carcinoma of the breast is three years; with radical operation about 38 per cent of the cases will be free from the disease for the natural duration of life, and that the average survival for five years will amount to about 30 per cent. Levin[55] advocates radical operation for cases of malignancy followed by postoperative radiotherapy in every case of malignant tumor of the breast.

In cases of mammary carcinoma in the young, Lee[56] et al., emphasize the poor end results following radical surgical intervention, but few patients survive the three-year period.

Chealte and Cutler[57] give an excellent review of the literature of Paget's disease of the nipple with a report of the clinical and microscopic study of 17 breasts by means of whole serial sections. The authors are not convinced that the formation of "Paget's cells" and the early separation of the basal epidermal cells from each other are preliminary to malignant disease of these cells. (This is an important contribution on Paget's disease.)

GENITOURINARY SYSTEM

Chronic inflammation of the female urethra may be due to an infection of the tubular glands located around and opening into the posterior portion of the female urethra. Folsom[58] described these glands and also some adenomatous papillary structures which he classifies as inflammatory rather than neoplastic. Concretions found in the posterior urethra have an autochthonous development. According to Renner[59] only the rudimentary prostatic portions can be considered as being the site of origin of the small stones. The glands which have been found correspond morphologically to the male prostatic glands. The character and dilatability of ureteral fistulae are determined by cystoscopic examination. Ottow[60] has shown that fistulae of the ureter which lie in the wall of the bladder can be cured by insertion of a permanent catheter into the injured ureter.

About 50 cases of primary carcinoma of the ureter have been reported in the literature. Renner[61] describes a primary carcinosarcoma of the right ureter.

In a report of 40 cases of enuresis Thomas and Hubbell[62] give as the main etiologic factors: (a) pathology of the urinary organs; (b) disturbance of the reflex arc, and (c) disturbance of cerebral control. Walz[63] diagnosed a case of enuresis ureterica by means of retrograde and intravenous pyelography and the kolposcope. If the kidney and bladder are not too badly inflammed the extravesical opening of the ureter is treated by bladder implantation. Fifty-five of Natvig's[64] 63 cases of urinary incontinence were due to mechanical causes. The latter are successfully treated by one of three methods: (1) Bonner's tightening of the sub-urethral fascia in cases without prolapse; (2) the interposition operation; (3) a pyramidalis fascia plastic operation.

In cases of urinary incontenence due to loss or destruction of the urethra and vesicle sphincter, Douglass[65] reconstructs the urethra and utilizes the levator ani muscle as a sphincter. He reports three successful cases. Mashbitz[66] recommends the direct muscle reinforcement in addition to a perineal plastic in the treatment of cases of incontinence. In his 53 cases there was one recurrence on the twelfth day, and one death. Acute urinary retention is often mechanical in origin. Snodgrass[67] reports a case due to hematocolpometra.

The opinion that every action of the ureteral ostium in the bladder is the motor termination of a peristaltic wave which originates in the renal pelvis and passes along the ureter is not always correct. Ottow[68] believes that the bladder ostia of ureters without kidneys or ostia without ureters show similar action.

EXTERNAL GENITALIA

Templeton, Stein and Schochet[69] note that spontaneous rhythmic contractions are present in the vagina of adult human females during the childbearing period and are absent in the menopause. These rhythmic contractions are most marked in the postmenstrual week and can not be induced or influenced by contractions from adjacent organs. (This important contribution is the first report in the literature dealing with the human species, and further studies should elucidate problems in frigidity and functional results of operative procedures. J. E. L.) Damm[70] reports a case of esthiomene of the vulva. He believes that the condition is caused by pathologic conditions of the regional lmyph nodes leading to a local blocking of the lmyph flow and lowering of the resistance of the tissues. It is due to a syphilitic infection and should be designated as syphiloma vulvae, according to A. Stein. Levin[71] describes ulcus vulvae acutum as a distinct entity appearing in three forms—gangrenous, venereal and malignant. It involves the labia majora and minora and is not infectious. Ulrich[72] points out that in the whole body economy only the stomach and the vagina supply acid secretions. Temporary or lasting hyperacidity of the vagina may be the cause of sterility. Baldwin[73] reports a case of primary carcinoma of the vagina in a girl fourteen years of age. Hinselman[74] advises the use of the kolposcope in examining cases of leukoplakia and carcinoma of the vagina. With a lens (in which there is a magnification of fourteen to forty) in the kolposcope he finds a condition which he calls "Felderung"[75] which accompanies leukoplakia and can only occur where cylindrical epithelium has been present. In this condition there is a filling of the abortive glands with epithelium or a filling of the ducts to the glands with epithelium.

Fels[76] was unable to produce experimental carcinoma by the application of tar to the vagina of the mouse. Less than one per cent of all carcinomas occur primarily in the vagina. At the Mayo Clinic from 1915 to 1925 there were 29 vaginal epitheliomas and 1246 cervical carcinomas—a ratio of one to forty-three. Two forms of early carcinoma occur, one simulates a benign papilloma (except for microscopic structure). The second form appears as a small firm nodule which later breaks down into an ulcer. Of the early cases treated with rays the average length of life was two years ten months and fifteen days. Of the early cases treated with surgery and radium the average duration of life was one year. With all methods of treatment Moench[77] reports a cure of 17 per cent. This deplorably low percentage indicates not only the high degree of malignancy but the failure of early diagnosis and ineffectiveness of our present methods of treatment.

Terwilliger[78] treated 42 infants with vulvovaginitis by means of gonococcal vaccine, and obtained a cure in 16 cases. Ivanov[79] made 200 biopsies in cases of acute or chronic vaginitis in which the specimens included the whole thickness of the vaginal wall. He found that the clinical phenomena may disappear and the mucosa appear normal while gonococci may still remain in the deeper layers. In acute gonorrheal vaginitis the infiltration hyperemia and other phenomena of inflammation frequently penetrate deeply into the muscle layer. (Experimentally this study of biopsy in vaginitis may be considered an excellent contribution.)

Monilia are frequently present in the vaginia of patients suffering from vulvovaginitis and may be concerned with its etiology. Monilia vaginitis in pregnant women is a definite source of infection in sporadic outbreaks of oral thrush in the newborn as reported by Plass.[80]

Cornell[81] was able to grow trichomonas vaginalis in Lynch's media. Of 38 of these patients 12 complained of symptoms of burning and profuse discharge.

Greenhill[82] prescribes the following procedure in the treatment of trichomonas vaginalis: thorough scrubbing of the vagina with tincture of green soap and water, then applying hexylresorcinol and inserting glycerine tampons. This is repeated every second day until two successive hanging drops are negative for trichomonas. Goodall[84] believes that vaginal cones of one per cent trinitrophenol inserted into the vagina each night act as a specific against trichomonas.

Goff[85] in a careful study of the pelvic floor could not demonstrate a true fascial plane in the walls of vagina, urethra, bladder and rectum. The muscular coat beneath the vaginal mucosa has been incorrectly called fascia. Bissell[86] in discussing the above article states that in 1929 he pointed out that the vaginal tissue used in the lapping technic for cure of cystocele was not fascia but muscle. W. Blair-Bell[87] calls attention to one of his publications in 1910, in which he described a uteropubic muscle layer derived from the internal muscle coat of the uterus. Bazala[88] describes three operations for artificial vagina, employing respectively the rectum, small intestine, and the sigmoid flexure. The first (Baldwin operation) has a high mortality with severe complications such as gangrene of the

intestine and ileus. The small intestine, when used as a vaginal canal in the Schubert operation, has a profuse irritating secretion which Stoeckel says can be controlled by diet. The use of the sigmoid flexure is more satisfactory because it is larger and more mobile, and the operation more easily performed. (Bazala.)

MENSTRUATION

There is convincing evidence from studies of the primate cycle that the theories of Bischoff and Meyer concerning the relation of menstruation to ovulation must be modified. Hartman[89] believes that menstruation begins with the Salachian fishes and that bleeding in the Mullerian derivatives is of widespread occurrence. The chief advances on the comparative side of menstruation have been made by zoologists among whom may be listed Heape and F. H. A. Marshall, and the American anatomists Corner, Hartman and Bartelmez. The size of the sella turcica in adolescent girls is related to the activity of the pelvic organs and the menstrual function.[90] Eufinger and Arntz[91] found that in 83.4 per cent of the 30 women studied, the sympathetic nervous system was affected by the menstrual cycle. Knaus[92] in a study of 25 patients with a 28 day menstrual cycle concluded that ovulation occurred 14 to 16 days before the onset of the flow. The obstetrical staff of the Kumamoto Imperial Medical College,[93] found that the shortest period of time between the first and second menstruation was a month, the longest four years and five months. In 92 per cent the average interval was from one to six months.

Hartman[94] et al. have shown that ovulation may be absent during long periods in which there is uterine bleeding. From their experiments it would seem to be possible to produce bleeding in a woman more readily than to stimulate a refractory ovary and hence a dormant uterus into action. The gynecologist must determine what benefit a patient receives from a mere bleeding without the usual concomitant œstrous and particularly without the pregravid changes.

It has been shown in the higher monkeys that there may be periodic bleedings from the uterus without ovulation. Clinically these are indistinguishable from menstruation, but occur in the absence of large follicles of corpora lutea. The above observations were first described by Van Herwerden, but the conclusive evidence was first obtained by Corner.

Bartelmez[95] in a study of the human uterine mucous membrane during menstruation found that the entire spongy zone is not always lost. In specimens from the uteri of the first day of menstruation, gland cells show great variability in the degree of involution due to the fact that in some cases the stimulus to secretory activity from the ovary probably continues longer than in others. The control of the vascular apparatus is independent of the cyclic ovarian changes. Cessation of menstruation after complete ovarectomy may be explained as due to the insusceptibility of a mucous membrane which has become atrophic. Variability of function in different regions of the same mucous membrane occurs during menstruation as well as during other stages of the menstrual cycle. (This paper is one of the few well controlled studies of menstruation in gynecologic literature.)

From a study of the morphology of menstrual blood Geist[96] is able to identify the true menstrual discharge in about 90 per cent of the cases. This will frequently aid in the differential diagnosis between menstrual bleeding and the other types of hemorrhagic vaginal discharge. (An excellent contribution.)

CERVIX

Neisserian infection with its far-reaching ill effect on the health of the individual, its intractable course and its attendant complications is one of the most important chapters in gynecology. Gonorrhea of the cervix is characterized by periglandular infiltration of round and plasma cells. Schröder[97] finds small abscesses around the fundus of the glands. The glandular epithelium is frequently replaced by stratified pavement epithelium.

Missett[98] reports a case of primary tuberculosis of the cervix. According to Bonnet and Bulliard[99] the cervix is less frequently involved with primary tuberculosis than any other part of the female genital tract. Usually it is found in women with active or inactive tuberculous foci in the body. (In our autopsy experience we found uterine tuberculosis associated with pulmonary tuberculosis much more frequent than reported in the literature.)

The mucosa covering the portio is invaded by syphilis more often than that of the cervical canal. Involvement of the parenchyma of the cervix is extremely rare. The lesions tend to become progressive until the entire vagina and uterus are affected. In an analysis of material at the Rivadavia Hospital, Puente[100] found 29 cases of chancre, 28 cases of secondary syphilis and three cases of leukoplakia of the

cervix. Chancre of the cervix does not cause symptoms, is of short duration and heals rapidly. Secondary syphilis of the cervix is generally thought to be very rare. The author found 29 among 222 cases of secondary syphilis (13 per cent). (The findings of secondary syphilitic involvement of the cervix do not tally with the reports of other clinics. The late Professor Warthin informed one of us that he observed only one case of secondary lues of the cervical endometrium in his extensive studies of syphilis.)

Whatever operative procedure is applied to the cervical area whether it be actual cautery, radium or Sturmdorf's cone excision, the complete destruction of infected racemose glands in the cervix is of paramount importance for the cure of the lesion. Holden[101] in a review of 500 case records gives the following contraindications to cervical cauterization: (1) where the disorder is one of several requiring operation; (2) slight inflammation without eversion or erosion; (3) simple edemas; and (4) those that do better with other treatment after trial of cautery. (We do not think that group four should be classified as a contraindication to cauterization when once attempted as a means of cure.) The treatment of cystic endocervicitis with electrocoagulation is equally as good as the Sturmdorf operation. Roblee[101] found no cases complicated by stenosis.

Thermocautery is preferred to electrocoagulation in cases of recent postpartum laceration where it is advisable to destroy the cervical tissue to the point of retraction. It is also to be preferred in recent postpartum erosions and recent postpartum endocervicitis. (In these cases the infection is usually superficial and is cured with silver nitrate or left to normal involution.)

In the chronic cervicitis group electrocoagulation is preferable. Roblee[101] however advises the combination of both methods in an endeavor to obtain the best results. Brown[102] prefers the Sturmdorf operation in cases showing extensive hyperplasia and cyst formation either with or without tears. Offut[103] points out three possible complications of cervical cauterization, namely, hemorrhage, stenosis and pelvic infection.

Rogge[104] states that the kolposcope is the only real method of early diagnosis of precancerous leukoplakia of the portio. (The kolposcope is a definite contribution to the gynecologic armamentarium. However, we should not lose sight of the fact that biopsy is a perfected and time honored method and is not an obsolete procedure for the early diagnosis of malignancy.) Schneider[105] recommends the use of the metranoikter for dilating the cervix when digital examination of the cervical canal is also indicated. (We prefer vaginal hysterotomy for this group of cases.)

UTERUS

The vascular system of the female sex apparatus plays a more important rôle in health and disease than gynecologists generally attribute to it. Polak and Mazzola[106] in a study of the effects of experimental torsion of the uterus on the vessels of the parametrium and contiguous tissues show, that displacements cause an increase both in the size of the uterus and in the number and size of the blood vessels. Interference with venous flow in the pelvis often causes varicosities in the absence of infection. (This is an important problem which has not received the attention that it deserves.)

Magid[107] in a study of 500 cases finds that there are certain types of women who present anatomic relations between spine and pelvis that are at variance with the norm and that the uteri in this group assume a position which is essential or normal to these types of women. Any attempt to correct these variations of position in this group of cases with the hope of relieving symptoms will result in failure. Agaronow[108] believes that myomas of the uterus develop as the result of hyperfunction of the ovary. Since the ovary and hypophysis influence the basal metabolic rate he urges a careful study of basal metabolism in the various disorders of the genital sphere. The studies of Vassitch confirm the belief in the frequent coexistence of uterine fibromas and arterial hypertension. He is of the opinion that the action of the fibromas in arterial tension is mechanical. Their frequent coexistence should be considered as an evolutionary coincidence.

Parfenoff[110] demonstrates degenerative changes in the ovary (especially in the follicle) of white mice following extirpation of the uterus. Removal of the uterus stimulates the formation of the interstitial gland which causes the atrophy of the follicle. Archer and Greenberg[111] present a case of floating uterus. Fluhmann and Morse[112] analyzed 1137 consecutive cases of abnormal uterine bleeding. They subdivided them into two groups as suggested by Cullen (1) hemorrhages associated with pregnancy and (2) hemorrhages in the non-pregnant. This report includes 507 hemorrhages in the non-pregnant state which are subdivided into: (1) menorrhagias in patients

with otherwise normal menses; (2) an irregularity in the menses due to disturbance of ovarian function of endocrine origin; (3) hemorrhages initiated with a menstrual period, that may be prolonged, with a lesion of the endometrium; (4) hemorrhages in the middle of the menstrual cycle caused by the rupture of the graafian follicle; (5) hemorrhages due to hyperplasia of the endometrium; (6) bleeding that follows amenorrhea due to hyperplasia of endometrium which follows ovarectomy; (7) patients with atypical irregular bleeding having no definite relation to the menstrual cycle, and (8) bleeding following menopause. Martin[113] asserts that chronic uterine hemorrhage without demonstrable pelvic pathologic changes is a common condition and that the etiologic factor is some abnormality of the endocrine system. Smith[114] believes that it is important to consider the question of allergy in all cases of essential dysmenorrhea. With the exception of a recent childbed or gonorrhoeic infection, Young[115] finds that inflammations of the endometrium or myometrium are rarely the cause of irregular and excessive uterine hemorrhages.

Brown[116] reports an unusual involvement of the uterus with tuberculosis. The process extended directly from the tubes to the myometrium with no apparent intervening involvement of the endometrium. (In this case it appears to us that the endometrium was most probably primarily involved, but that the existing endometrial port of entrance healed or was removed by the normal destruction which occurs during menstruation.)

Holden[117] describes a case of adenomyoma of the uterus in a girl fourteen years of age. De Gaetano[118] noted that uterine myofibromas develop more commonly in women of somewhat masculine appearance with a brown complexion, robust, full-blooded with down on the upper lip, chin, over the linea alba and on the limbs. They have a tendency to obesity with an exaggerated libido and leaning toward their own sex.

Uterine hemorrhages cause a salutary effect on the stasis of the inferior caval system. Lebon and Laffont[119] report a case of uterine bleeding due to mitral stenosis.

Nurnberger[120] emphasizes the importance of the pathologically increased elimination of hypophyseal substance in the urine, in cases of hydatid mole and chorionepithelioma malignum. (It is difficult to determine accurately this increase of anterior pituitary hormone on biologic assay.) Bompiani and Martinotti[121] advise a hysterectomy in hydatid mole for grave hemorrhage, anemia, and in those cases in which chorionepithelioma is suspected.

Leiomyosarcomas of the uterus are found in one per cent of all myomatous uteri examined. Meaker[122] describes four cases, one of which was a true myoma malignum. Although only a small portion prove to be clinically malignant, all leiomyosarcomas must be treated as potentially malignant with a radical operation followed by x-rays.

Schmitz[123] reviews eight cases of malignant and three cases of benign choriomas. The persistence of chorionic connective tissue of the villi with proliferation is characteristic of the benign choriomas. Absence of connective tissue with an aplasia and atypia of the chorionic epithelium is characteristic of the malignant type. (We find it often very difficult to make a diagnosis of chorioma malignum from microscopic slides.) Roentgen-ray examination and the Aschheim-Zondek pregnancy reaction may be of value in the diagnosis of a malignant chorioma. Hysterectomy followed by radiation lessens the number of recurrences.

Fluhmann[124] considers hyperplasia of the endometrium to be part of a definite clinicopathological entity. It was found in 2.8 per cent of 1700 patients admitted to the gynecologic service of the Stanford Hospital, and in 12.2 per cent of 507 women with abnormal uterine hemorrhage. Bleeding is the most constant symptom. Functional studies have demonstrated an excessive production of the female sex hormone.

The cause of endometrial hyperplasia is still inadequately understood. Many workers believe that an unrecognized endocrine factor is concerned in its etiology. According to Hofbauer[125] it may reasonably be regarded as the manifestation of an overactivity of the anterior pituitary lobe. This view is corroborated by the clinical experience that the condition commonly recurs after repeated curettage.

Neumann[126] reports a case with increase in the lymph follicles of the endometrium, probably a part of a picture of status lymphaticus. (From the reports of many anatomists it appears doubtful that lymphatics are present in the endometrium.)

Menstrual molimina in a rudimentary uterus have a psychosexual etiology. In this type of case, Kehrer[127] states, operation is useless.

Hirsch-Hoffman[128] concur in the accepted belief that primary amenorrheas of young girls with hypoplastic genitalia, and secondary amenorrheas following abortion or confinement react best under hypophyseal hormone therapy. Novak and Hurd[129] treated 51 cases of functional uterine hemorrhage with an anterior pituitary luteinizing principle derived from the urine of pregnant women. In 44 cases they

successfully checked the abnormal bleeding. The characteristic anatomic finding is an absence of corpora lutea. (This is an important contribution to the study of functional bleedings.)

When there is considerable inflammation of the adnexa with a fixed retroverted uterus, Werner[130] performs a vaginal hysterectomy in which the uterus first is split and each half is extirpated with the adnexa, beginning with the side which is less difficult to remove. (It seems to us that the abdominal route is preferable in this group of cases.)

In women under 41 years of age, myomectomy is the operation of choice. Bonney[131] has performed myomectomy 403 times with an operative mortality of 1.7 per cent. In single instances he has removed from 15 to 125 myomas. In 3 per cent of his cases he subsequently performed an hysterectomy for recurrent fibroids or for hemorrhage. Of the women of childbearing age who were subjected to myomectomy 39 per cent later became pregnant. The operation should not be performed unless the uterus apart from its contained fibroids is reasonably healthy, and malignancy is not suspected. Consoli and Allesandri[132] regard myomectomy as an operation destined to be more widely used in dealing with women during the childbearing age. Cova[132] in 1000 laparotomies performed an hysterectomy 202 times and myomectomy 16 times. (As a rule, the postoperative course in myomectomy is more stormy than in hysterectomy.)

Burch and Burch[133] report nine deaths in a series of 200 consecutive hysterectomies, a mortality of 4.5 per cent. They stress the danger of hemorrhage under spinal anesthesia and condemn the use of zinc chloride as an agent for chemical hysterectomy. (This high mortality is most probably due to other causes than the operative procedure.)

Howard Kelly[134] says that x-ray is practically a specific in menopausal hemorrhage. Koenig[135] used radium therapy in 85 cases of noncancerous diseases of the uterus with excellent endresults. Corscaden[136] was able to follow up 393 of 434 women treated with rays for benign uterine conditions. The average follow-up was seven years. He found that radiation is a safe method. A reduction in the size of the fibromyoma occurred in 96 per cent. There was a complete disappearance in 55.2 per cent; the uterus was reduced nearly one half in size, in 28.3 per cent, and a definite but unimportant reduction occurred in 12 per cent. Van Dongen[137] prefers operation to x-ray in the treatment of myomas on account of the menopausal symptoms due to radiation. (We believe that surgery is preferable.)

MALPOSITIONS AND DISPLACEMENTS

In spite of the apparent frequency of ureteral dilatation in cases of prolapse of the uterus, serious bladder and kidney symptoms ascribed to this cause have rarely been reported. Robert Frank[138] has found only two cases in the literature in which there was a fatal outcome. He reports a case of complete prolapse of the uterus with bilateral pyonephrosis, extreme bilateral hydonephrosis and dilatation of the ureters.

Marondis[139] describes a case of complete genital prolapse in a baby with aplasia of the pelvic floor. There was no evidence of associated spina bifida or bony maldevelopment of the pelvis.

Meshberg[140] discusses 128 interposition operations for prolapse. As a rule amputation of the cervix, perineorrhaphy, ligation of the tubes, plication of the vesical sphincter and curettage were performed with the interposition. Cystitis was the most troublesome complication. Ninety-two patients were traced. Among them were six operative failures (6.5 per cent), and seven symptomatic failures. (It should be borne in mind that the average failure of all forms of operations for prolapse of the uterus among different surgeons is reported as 10 to 12 per cent.)

Rongy[141] favors the vaginal fixation operation. Properly executed in selected cases it will cure the largest number of patients. One of the commonest criticisms of this operation is that so many patients complain of bladder disturbances. Graves and Smith[142] review 3358 cases operated upon for suspension of the uterus by Olshausen's method. The defects in this operation are postoperative sinus, intestinal obstruction (which occurred in six cases), and hernia at the site of the suspending ligature. Of the total number 17.2 per cent were not traced; 66.8 per cent were cured symptomatically; 27.3 per cent were relieved; failure occurred in 5.6 per cent. In 76.9 per cent of the cases the uterus was found in good position. There was complete recurrence in 8.8 per cent, and partial recurrence in 14.2 per cent. Westman[143] reports 69 cases of interposition operation with colpoperineorrhaphy with a primary operative mortality of 4.3 per cent. Of 61 patients followed up 85.2 per cent were free from symptoms; 6.6 had slight and 8.2 per cent considerable discomfort.

Lagerson[144] describes a modification of the Webster-Baldy operation in which the round ligament is attached to the posterior wall of the uterus after pulling it through the subserous tissues, thus causing better adhesion and firmer suspension. (In our service we prefer vaginal hysterectomy for prolapse.)

MALIGNANCY

As a result of the apparent increase in the number of cancer patients and the comparatively poor results of treatment—due to late diagnosis, there exists a continuous movement toward greater and greater specialization in the cancer field. Lombard[145] states that less than two per cent of the cancer patients in Delaware report early enough for successful treatment. The figures for certain cancer hospitals in Philadelphia and New York City are 4.2 per cent and 25 per cent respectively for operability.

Our only hope to combat this deplorable state of conditions lies (1) in the establishment of cancer centers with well organized institutes and tumor clinics; (2) education of the general medical profession in the early recognition of malignancy and (3) propaganda for a routine periodic examination among the lay public.

A cancer institute according to James Ewing,[146] the world's foremost authority on neoplasms, should consist of cancer hospitals with large clinical material, well trained staff of specialists in the clinical branches with special equipment and specialists in departments of radiobiology, radiophysiology, radiotherapy, biochemistry, biophysics, general biology, genetics and pathology. The pathologist must be well trained and highly specialized in tumor pathology. An institute of this type requires money. Ewing is of the opinion that it is of questionable wisdom to attempt to establish a cancer institute with an endowment of less than ten million dollars. The tumor clinics of the general hospital are purely diagnostic with limited means for therapeutic treatment. They are great aids in combating malignancy provided they recognize their limitations and do not prostitute the true meaning of a cancer hospital. At present there are 40 cancer diagnostic clinics[147] in the United States but their rôle will have limited effect in reducing the rising incidence and death rate from cancer.

Bloodgood[148, 149] finds that more ample provision for physicians to become proficient in the diagnosis of precancerous and early stages of cancer is needed. Von Franqué[150] cites Winter as reporting that procrastination in the treatment of carcinoma in patients under his care during the period from 1911 to 1920 could be attributed to physicians in 21.5 per cent of the cases, to midwives in 3.4, to quacks in 0.6 per cent and to the women themselves through ignorance and carelessness in 74.5 per cent.

Occasionally complications result from biopsies, but Epstein and Fedorejeff[151] find that the percentage of these cases to the total number of biopsies is insignificant. There is only an apparent immunity against cancer in complete procidentia, although Delvaux[152] states he has never observed cervical carcinoma in cases of complete prolapse. Hofbauer[153] describes metaplastic changes of the cell character, and displacements of the epithelial connective tissue line in the cervix during pregnancy. He assumes that these changes may be of etiologic significance for the development of malignant growths. In an analysis of tumor resistance, Waterman [154] finds that the cancer cell is the product of fermentative degeneration, and that injection of spleen extracts induces tumor cell resistance. This view in part is confirmed by Edelmann, Schönbauer and Schloss[155] who find that autolysates from fresh carcinomas dissolve carcinoma cells. In the twenty-ninth annual report[156] of the Imperial Cancer Research Fund, many striking examples are mentioned of cases in which tumor cells proved more resistant to radium than normal cells. It is a known fact that there are individuals who are especially sensitive to radium.[157] Martland[158, 159] from his extensive studies on workers in radioactive products suggests that certain conditions (bone sarcomas) may depend on the presence in the human body of increased amounts of radioactive substances. The sale of all radioactive waters, emanators, activators, etc., should be under Federal control.[160] Crile[161] thinks that cancer owes its development to some alteration in the cells of the tissues as a result of some mechanical, physical or chemical factor. (Suggestions without proof do not materially aid in the solution of the cancer problem.)

Maud Slye[162] reports a very interesting group of records of an entire single strain of mice from mating of a cancerous female and noncancerous male and bred through three generations. There were 11 per cent of cancerous offspring which closely approximates the percentage of occurrence of neoplasm in man.

Hinselman[163] has given us a valuable instrument—the kolposcope for the diagnosis of leukoplakia.

Three interesting cases of primary vaginal carcinoma are cited in this year's literature. Wolfe's[164] case due to irritation from a pessary; Gragert's[165] case of choristoblastoma from the vagina with probable origin from elements of the rectal mucosa; and Baldwin's[166] report of a primary carcinoma of the vagina in a girl of fourteen. The endresults of the treatment of primary vaginal carcinoma are not encouraging. Buben[167] employs x-ray and radium. Of 28 patients reported nine are living although only two of them can be regarded as cured. Heyman reports two recoveries in 16 patients treated with radium at the Royal Institute of Stockholm.

A large percentage of cancer cases seen in clinics is so far advanced that the diagnosis is obvious. This may be due to the fact that the early diagnosis is difficult and not necessarily due to gross ignorance of the general practitioner. Schneider[168] finds that the miostagmin reaction is of diagnostic value and is useful in determining the prognosis of many cases in regard to radium treatment. Hoehne[169] reports an increase in the cholesterin in blood serum of carcinomatous patients after x-ray treatment which is absent in cancer-free patients. (In spite of these valuable laboratory aids the importance of clinical symptoms must not be overlooked.) Whitehouse[170] states that in 30 per cent of all women who suffer from cancer the organ first involved is the uterus. The earliest and most important symptom of carcinoma affecting the uterus, whether it be cervix or corpus, is almost invariably hemorrhage.

MacCarty[171] believes that it is a grave mistake with present knowledge to use any one criterion as the basis of clinical prognosis in cancer. The mere microscopic grading of cancer is not of great clinical value when the other fifteen or more factors governing prognosis are not considered. Döderlein[172] finds that adenocarcinoma of the cervix has the most unfavorable prognosis irrespective of the degree of maturity of the cancer cells. The histologic character of cervical carcinoma is of importance only in so far as adenomatous cancers yield to irradiation much less readily than solid carcinomas. Taylor[173] presents a clinical and pathologic study of 739 cases of gynecologic cancer observed at the Roosevelt Hospital. In 1921-1923 the plan of treatment for favorable cases was preoperative radium and later radical hysterectomy; the absolute five year cure rate was 29.7 per cent. A careful review has led to little corroboration of the claim of several writers that histologic form bears a relation to prognosis as the result of variations in malignancy or in radiosensitivity.

There is a small group of inoperable cases of cancer reported from unquestionable sources that have been cured merely by palliative means.[174, 175]

The Mayos[176] found in their records 99 cervical stump carcinomas. Of this number 12 had been previously operated for benign conditions in their clinic and 23 in other hospitals. The authors believe that a lower incidence of stump carcinoma results from their routine of coning out the cervix in all cases of subtotal hysterectomy.

Primary carcinoma of the fallopian tubes according to Stubler and Brandes represents 0.45 per cent of all genital cancers. An approximate idea of its rareness is conveyed by the fact that it occurred but once in 19432 gynecologic cases at the University Hospital in Philadelphia; five times in 35000 cases at Johns Hopkins Hospital; and three times in 30000 at the Bellevue Hospital. About 234 cases have been reported in the literature since Orthmann's first description of primary carcinoma of the tubes. During the past year, Anspach and Hoffman[177] recorded two additional cases; Rabinovitch and Horton[178]; Johnson[179] and Hunter and Holden[180] each one case.

Ovarian carcinomas are not rare. They differ from other neoplasms in their histogenesis, character, and radiosensitivity. According to Monlonguet and Mallet[181] the sarcomas are more radiosensitive than the epitheliomas. Metastasis to the thyroid gland is rare although Wegelin has frequently found it present. Hoffman[182] records a case of carcinoma of the ovary with metastases in the thyroid gland and with Basedow's syndrome.

Anspach and Hoffman[183] look upon chorionepithelioma of the uterus in a certain sense as a physiologic process overstepping its normal bounds. An atypical case is described in which free intraperitoneal hemorrhage occurred due to perforation of the uterine wall. Although most authors recommend surgical treatment for chorionepithelioma, Wintz[184] reports eleven cases in which he employed irradiation. He has found that these malignant cells are from 40 to 50 per cent more sensitive to rays than the cells of the surrounding normal tissues. Of this group, 8 patients are still alive.

A cross-section study of the published reports of treatment of carcinoma of the cervix and uterus strongly suggests that equally good results may be obtained with radiotherapy as with surgical procedures. It must be borne in mind, however, that

these results are obtained only by those workers who are thoroughly trained in radium therapy. If the dosage is suitable for a certain case, the cancer cells but not the normal tissues are destroyed. If the cancer cells are radiated insufficiently they become radioresistant. Ward and Farrar[185] are of the opinion that this danger occurs only when prolonged applications of heavy dosage are used and when they are repeated at too frequent intervals. Of 170 of their cases of epidermoid and adenocarcinoma of the cervix, 50 per cent had more than one radium treatment and 26.5 per cent of all radiated patients lived five years or more. Lynch[186] reviewed 192 cervical cancers of a five to fifteen year period and found that nearly one-fourth of the five year survivors died subsequently from recurrence of their original cancer or developed other cancers of equal importance. Crossen's[187] series of 121 cases of five year cures consisted of 108 squamous cell carcinomata and 13 adenocarcinomata. Classed clinically there were two in Group I; one in Group II; 108 in Group III; and ten cases in Group IV. The two patients in Group I were operated without radiation and survived eight and nine years. Of the 108 patients in Group III, 24 survived for five years and 21 of the latter are still living, some as long as eight years after treatment. Of the 10 patients in Group IV not one survived five years. The author emphasizes that the time to cure cancer with greatest certainty is before it starts. In a review of 325 cases of carcinoma of the cervix Jones[188] believes that surgery is excellent treatment for early cases but that irradiation will cure as many of the early cases as will surgery without any mortality or morbidity.

Healy[189] analyzes 1574 cases of cervical cancer. Histologically 97.3 per cent of the cases were squamous epidermoid carcinomas and 2.7 per cent adenocarcinomas. Only from 20 to 22 per cent of all patients treated survive five years, regardless of the method of treatment employed.

It is difficult to correlate statistics from various sources because of the great personal equation that enters into the classification of patients according to the clinical stage of the growth. Neef[190] feels that as a fair average it might be said in round numbers that the five year cures which have been obtained by radiotherapy amount to about 36 per cent in operable, 26 per cent in borderline, and 16 per cent in advanced cases. Similar endresults in large series were reported by Scheffey,[191] Bartlett,[192] Dailey[193] (age incidence) Held,[194] and Povey.[195]

The operative mortality of the Wertheim operation in 407 cases reported by Bonney[196] was 14 per cent, but in the last 100 of his cases it was only 6 per cent. The Schauta-Stoeckel vaginal operation for cancer of the cervix is described in detail by Maluschew.[197] Stoeckel[198] is convinced that with his vaginal operation one can remove more of the parametrium and that there is less bleeding. Three or four weeks after the operation deep x-ray treatments are given. Mosquot and Boquel[199] discuss the end results of their 65 cases in which hysterectomy was performed by the combined vaginoabdominal route. In this series the operative mortality was 9.23 per cent.

(A cross-section study of the endresults of treatment of carcinoma of the cervix with irradiation, with surgery alone, or surgery followed by irradiation convinces us that the ideal method of treatment has not been found.)

ENDOMETRIOSIS

We are indebted to Sampson for presenting a most comprehensive study of endometriomata and for focusing attention upon the frequency of this condition. In well controlled experimental studies, Schochet, Allen and Bauer, have conclusively shown that endometrial transplants in the anterior chambers of the eye grow for long periods of time and undergo marked hyperplasia. Everette[200] confirms Sampson's studies on tubal endometriosis and finds strong evidence that tubal epithelium by metaplasia may give rise to endometriomata. Behring[201] believes that these hyperplastic changes or so-called endometriomata may be due to disturbances of the female sex hormone. In a careful survey of endometriomata King[202] concludes that the ductless glands play a greater rôle in the etiology than accepted, and that Sampson's theory of implantation should receive further study. Derichsweiler[203] discusses the etiology of endometriosis but offers little additional data except an extensive classification. Many interesting cases of endometriomata are reported with new groups of symptoms. Schuler[204] cites a case of ileus due to endometriosis of the intestine; Thompson[205] presents a careful study of endometriosis of the umbilicus; and Marcus[206] discusses endometriosis of the round ligament. Novak[207] describes three cases of rupture of endometrial cysts with clinical symptoms of a twisted ovarian cyst in one and of acute appendicitis in the other two cases.

ABORTION

There occurs one abortion to three deliveries. Taussig[208, 209] emphasizes the fact that the death rate of abortions is seven times greater than that of full term childbirth. Reports from Russia show that the routine performance of legalized abortion, as a hospital procedure under aseptic precautions, has caused a marked decline in the maternal death rate. At Moscow (in 1926) 29,306 legalized abortions were performed without a reported death. In 2366 secretly performed abortions there were 35 deaths.

The maternal deaths are estimated as 15,000 in the approximately 700,000 criminal abortions annually performed in the United States. In a survey, by the Austrian Public Health Service, of 9000 abortions, pathologic sequelae developed in 9.6 per cent with a mortality of 0.75 per cent. There were two women who had fifteen abortions, and one who had sixteen!

Agaronou[210] reports five cases in which foreign bodies were left in the uterus in the attempt at abortion. Metzler[211] is in accord with the present day conservative treatment of abortion. Heine[212] recommends the use of perkain as a parametrial local anesthetic for emptying the uterus for a diagnostic curettage.

ECTOPIC PREGNANCY

Of the many possible etiologic factors of extrauterine pregnancy, inflammatory lesions of the adnexa or adjacent organs are the more important. Desjardius[213] finds that radiotherapy is a most valuable adjunct in the treatment of acute, subacute and chronic inflammatory processes and that this method has not received the attention it deserves. (We are of the opinion that x-rays destroy the protective ferments and immune bodies.) The diagnosis of ectopic pregnancy in many instances is very difficult. Wladika[214] points out the great value of the Aschheim-Zondek test in the diagnosis of ectopic pregnancy and hydatid mole. Szello[215] cites two cases of intraligamentary pregnancy proved by roentgenoscopy (negative x-ray findings do not always exclude ectopic pregnancy); d'Allaines and Doubrere[216] describe the extrusion of fetal parts of a tubal pregnancy via the intestinal tract.

Müller and Oberling[217] report an increase in the number of cases of ectopic pregnancy for the period from 1925 to 1930 which parallels the increase in gonorrhea. A valuable aid in the diagnosis of ectopic pregnancy is locating a peritoneal inundation, a piercing pain in the culdesac on deep palpation. Contrary to these findings, Van Etten[218] points out that only 10.4 per cent of his 77 cases showed evidence of preexisting inflammation. Ricci and DePalma[219] analyzed 100 cases of ruptured extrauterine pregnancy with profuse bleeding. There were 11 errors in diagnosis. In 16 cases there was no sudden lancinating pain and syncope. The authors employed autohemofusion in 11 cases. (We cite these papers to indicate that there still exists a marked divergence of opinion as to the rôle infection plays in the causation of extrauterine pregnancy.)

In 1878 Spiegelberg formulated certain criteria to be fulfilled before cases may be accepted as true ovarian pregnancy: (1) the tube on the affected side is intact, (2) the fetal sac occupies the position of the ovary, (3) this sac is connected with the uterus by the ovarian ligament and (4) ovarian tissue is found in its wall.

In 1906, Williams described 13 authentic cases of ovarian pregnancy, and in Lewis' System of Surgery 45 cases of ovarian pregnancy are accepted as authentic. Cramer's[220] case of ovarian pregnancy fulfills Spielgelberg's formula.

STERILITY

The study of sterility in the female requires a more thorough understanding of the physiology and pathology of the generative system and associated organs than any other gynecologic condition. Mazer and Andrussier[221] maintain that ovarian function is dependent on hormonal stimulation from the pituitary gland. The test of Frank and Goldberger for the blood level of female sex hormone is of great value in the diagnosis of functional sterility in regularly menstruating women but is of little value when associated with menstrual disorders. The recovery of a demonstrable quantity of anterior pituitary sex hormone from the blood of women suffering from functional sterility is pathognomonic of primary ovarian failure. Low dosage irradiation of the affected endocrine glands was successful in reestablishing menstrual periodicity in more than 50 per cent of 38 women thus treated.

Knaus[222] estimates that fertilization occurs at the time of the termination of the process of ovulation. In a healthy woman who menstruates every twenty-eight days, ovulation takes place between the fourteenth and sixteenth day of the menstrual

cycle and the conception capacity is limited to the time between the eleventh and seventeenth day.

Bjorkenheim[222] reviews a series of 524 cases of sterility of which 424 were of the primary and 100 of the secondary type. Included are only patients sterile after three years of marriage. The most common etiologic factor was an inflammatory change in the adnexa and parametrium present in 35 per cent of the cases. Of 417 cases treated nine required surgical intervention. According to Newell[224] sterility occurs more commonly after puerperal than after gonorrheal infections. Moench and Holt[225] believe that the sperm head is the greatest single source of information as to the fitness of the male cell for reproduction. In the average cases the relative number of the abnormal sperm heads affords an index to reproductive fitness of the male. They found that a normal specimen of semen contains 19 to 20 per cent of abnormal sperm heads. If this number increases to from 20 to 23 per cent impaired fertility can be assumed. Schultze[226] suggests contrast visualization of the female genitalia as a complement to the other diagnostic methods of sterility. Smith[227] employs the combination of iodized oil and pneumoperitoneum, and believes it to yield the maximum information regarding the pelvic organs. It is surpassed only by exploratory laparotomy.

Turco[228] reports four cases in which surgical implantation of the tube was followed by tubal patency. In two cases the patients became pregnant and delivered at term.

Montag[229] recommends prolan as an aid in the treatment of sterility due to tubal infection. Naujoks[230] for temporary sterilization crushes and ligates the ampulla. Later if desired a salpingostomy can be performed. Haberland[231] discusses the possibility of producing temporary sterility by injection of hormones from ovary and placenta. (In the present state of knowledge concerning hormones, therapeusis should be more conservative.)

FALLOPIAN TUBES

Robins and Shapira[232] conclude from their experience with 1000 cases of hysterosalpingography that the dangers of tubal injections are infection, rupture of tube or uterus, extravasation of lipiodol into the blood vessels and abortions. This method is contraindicated in frank infections of any part of the genital tract, in hemorrhage, in pregnancy, in the presence of fever. Novak[234] cites a case in which it was necessary to remove the contrast material fifteen months after the injection. Gajzago[235] describes a death following the injection of iodized oil. Dutailles[236] shows the value of hysterosalpingography in the diagnosis of spasmodic obstructions of the fallopian tubes, and peritubal and periuterine adhesions. Markoff[237] inflated the tubes in a series of fetuses and found that in numerous instances the tubes were impermeable. He believes that many sterile women have a congenital impermeability of the tubes which is the cause of permanent sterility.

Baldwin[238] describes an instrument that will serve equally as well for the Rubin tests, injections of opaque media and pneumoperitoneum. The differential diagnosis between appendicitis and salpingitis is difficult. Polak states that appendectomy has been erroneously performed in 10 to 15 per cent of cases where tubal disease is the existing pathology. Ricci[239] emphasizes the importance of disturbed menstruation in the diagnosis of salpingitis. Fluhmann[240] finds abnormal uterine bleeding in 35 to 50 per cent of all patients suffering from acute or chronic salpingitis. The important factors concerned in the production of bleeding are (a) interference with uterine contractions from adhesions and malpositions, (b) pelvic hyperemia, (c) endometritis, (d) ovarian deficiency and (e) corpus luteum abscess formation.

Carlisle[240] in a series of 602 patients with pelvic inflammatory disease reports abnormal uterine bleeding in 40 per cent. According to Ivanov[241] the paravaginal lymphatic plexus is an important route in the extension of infections involving the internal female genitalia. Bearse[242] corroborates Curtis's observation of flimsy cobweb-like perihepatic adhesions in a case of gonorrheal salpingitis three weeks after the onset of the disease. Downer and Brines[243] operated on a seven-year-old girl and found a torsion of the left adnexa with no apparent tuboovarian disease. This is the nineteenth reported case in the literature. Fainselber and Portret[244] use diathermy in the conservative treatment of chronic salpingitis and report cures in 53 of 56 cases. Gellhorn[245] warns against the use of diathermy in acute and early subacute cases of salpingitis. The principle field of diathermy in gynecology is in the treatment of chronic pelvic infections.

Holden and Gurnee[246] recommend the Elliot treatment in acute salpingitis because it causes a more rapid absorption of the pathologic exudate. This is due to the fact

that a consistently uniform temperature of 130 degrees can be maintained for any length of time against the large area of distended vagina, cervix, parametrium and pelvic organs. Of 5233 treatments with the Elliot apparatus in 500 cases at the Bellevue Hospital there were one severe burn, eight mild burns in the lateral fornices, and eleven slight burns about the introitus. This method causes a more rapid resolution in shorter periods of time than any of the other methods of treatment.

Crainicianu and Pavelescou[247] applied regional vaccine therapy at the primary focus (Skene's ducts) in acute and subacute infections of the genital tract and report considerable success. (This study requires corroboration.) Douglas and Shelden[248] advocate the extraperitoneal surgical drainage of parametric exudates (the method of Cullen) for it shortens the convalescence and lessens the morbidity.

FEMALE SEX HORMONE AND OVARY

It is estimated that there are more than 3000 papers published annually on the glands of internal secretions. During the past few years there has been disproportionately larger activity in the study of the female sex hormone by anatomists, biochemists, physiologists and gynecologists with the result that many new "chemical messengers" have been partially isolated. Robert T. Frank[249] rightly states that when one analyzes the sex physiology in the female, it is necessary for one to consider all these chemical messengers or hormones. (This contribution on the rôle of the female sex hormone throws much light on many of our clinical problems.) Allen[250] discusses the endocrine activity of the ovary with special reference to the recent work on follicular and corpus luteum hormones and outlines the present conception of the factors responsible for the periodic changes in the genital organs during the menstrual cycle. The outstanding animal reaction to follicular hormone, "theelin" is growth of the accessory genital tissues. The same rules for the standardization of aqueous and oily solutions of hormones can not be applied to both. Dodds[251] has shown that with purified hormones effect can be produced in animals by oral administration. More recently a second estrogenic substance[252] "theelol" (a triatomic alcohol) has been isolated from the urine of pregnant women which is several times more active on immature female rats than theelin. Wehefritz[253] finds that the female sex hormone of one species is capable of producing iso-sexual changes in an animal of another species, and that the female sex hormones are biochemically identical. Engel[254] produced a substance in male dogs, with physiologic functions similar to the female sex hormone, by exposure of the skin surface of these animals to radium radiation. Roentgen radiation does not affect the estrus hormone but ultra-violet light renders it inactive.[255] It has also been shown that the female sex hormone when administered to hyacinth plants causes an acceleration of blooming.[256] Birch[257] reports that patients with hemophilia are benefited by ovarian therapy and that urine of patients with severe hemophilia is deficient in the female sex hormone. The female sex hormone has also been reported to inhibit conception in animals.[258, 259]

The term "progestin" was applied by Allen and Corner[260] to the hormone of the corpus luteum which maintains the uterus in a normal state of pregnancy in castrated rabbits. In experimental work progestin causes proliferation of the endometrium for the nourishment and implantation of ova, growth of the decidua, maintenance of pregnancy and inhibition of ovulation. In addition to these functions Smith and Smith[261, 262] have shown that progestin through stimulation of the suprarenal glands has a metabolic and vasomotor function. Mammary activity after gestational hypertrophy has been generally accepted as due to the corpus luteum. In Corner's[260] observation highly potent preparations of progestin, administered to nonpregnant animals, have failed to influence the mammary glands. It is suggested by Steinach and Kuhn[263] that lutein tissue produces male sex characters. (We concur with Hartman's view that the recent studies on the corpus luteum problem leave one with a diminished respect for biologic theory.)

Fellner[264] reviews his sixteen years' experience with the female sex hormone, which he designates as feminin. The results recorded are favorable in certain groups of cases but in most instances it has failed to give the expected clinical cures. Goldstine and Fogelson[265] have employed an aquaeous estrus-producing hormone extracted from the placenta in 30 cases of irregular uterine hemorrhage or the so-called idiopathic climateric bleeding and report that they were able to control the "irregular uterine bleeding" in about 25 of the 33 cases treated.

We will not attempt to discuss the recent advances in knowledge of the physiology and pathology of the anterior hypophysis in relation to the female genital organs, since this subject was recently presented in this Journal by Fluhmann[266] in a Collective Review of more than 170 publications.

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Selected Abstracts

Pregnancy and Disease

Wells, A. S.: Syphilis and Pregnancy. J. M. A. South Africa **3**: 333, 1929.

In studying a series of 1000 blood examinations made in pregnant women, the author found that 28.2 per cent showed lues by the Wassermann test. In 399 tests of the placental blood 20.5 per cent were positive. He points out that this percentage is 4 to 5 times greater than that found in Europe, if compared with Gammeltoft's 5.5 per cent. He calls attention to the differences of syphilis in male and female, laying stress particularly on the latency of the disease in the female during pregnancy. He advocates Gammeltoft's provisions for eradication of syphilis as applied at present in Denmark.

Frank Spielman.

Audebert and Aversing: The Bordet-Wassermann Test On the Milk. Bull. de la Soc. d'obst. et de gynéc. **5**: 420, 1931.

According to Audebert and Aversing there are two objections to performing a Wassermann reaction on mother's milk. First, there are bacteria which cannot be eliminated and which lead to errors because they develop an acidity or an alkalinity which may result in false reactions. Secondly, the readings are made very difficult and sometimes impossible by an opalescence due to gray substances. The latter cannot be removed even by centrifuging. Because of these objections the authors compared a series of Wassermann tests on the milk and on the blood of the same patients. Among 135 specimens of milk, readings could not be made in 32. In 98 cases a negative milk reaction agreed with a negative blood reaction, 1 strongly positive milk test agreed with a strongly positive blood test, 3 negative milk tests were associated with positive blood tests, and 1 positive milk test was associated with a negative blood test.

These results indicate that milk cannot replace blood for the determination of the Wassermann test.

J. P. GREENHILL.

Abruzzese: The Passage of Bismuth from Mother to Fetus and to the Lactating Young. Riv. ital. ginec. **10**: No. 4, 1929.

The author made chemical, histochemical and radium researches on women and on female rabbits, examining placenta, membranes, maternal and fetal tissues, urine of fetuses at birth and during the lactating period.

He finds that in woman the bismuth is found in the placenta, but not in the fetal tissues. In the placenta, however, it is not in such quantity as to be demonstrable histologically, though it is found in greater concentration by injecting soluble rather than insoluble salts. In the urine of the fetus at birth there is no bismuth, but it appears during lactation. In the maternal urine, bismuth is found both before and during parturition. Only treatment with intramuscular injections was followed in woman.

In the female rabbits the same results were obtained with intramuscular and intravenous injections. The bismuth was found both in the placenta and in the fetal viscera both when solutions and colloidal suspensions were utilized.

SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

Gardiner-Hill, H.: Pregnancy Complicating Simple Goitre and Graves Disease. Lancet **1**: 120, 1929.

Thyroid disease complicating pregnancy has been classified as: simple goiter of adolescence; simple goiter developing in adult life; primary Graves disease and secondary Graves disease. The total number of cases studied were 115, or 12, 14, 71 and 18 respectively.

In both types of simple goiter the thyroid gland hypertrophied during each pregnancy with the tendency to, or the development of a hyperthyroidism in later years. A history of sterility was found in some in whom the simple goiter had developed in adult life. In a few of both groups of simple goiter repeated abortions had occurred. In these the administration of thyroid extract seemed to prevent such terminations in later pregnancies.

The course of pregnancy was little affected when the primary Graves disease developed during the gestation. Slightly over one-half of the cases had one pregnancy after the development of this disease, but few had more. Spontaneous terminations were most likely to occur during the first four months, but after this

time full-term deliveries could be expected. The probabilities are that abortions depended more upon the severity rather than the duration of the disease.

Exacerbations of symptoms were more frequent in abortions than after delivery of viable babies. The explanation offered is that the patient's mental reactions to these endings made a considerable difference in the symptoms. An improvement in symptoms usually occurred with the advance of the pregnancy, and was augmented by mental and physical rest and treatment.

In secondary Graves disease pregnancies usually occurred before evidence of the disease. Only about 11 per cent became pregnant after symptoms of this disease were present.

The author in recapitulating states that patients with either of the simple goiters may safely be advised to conceive, providing that some form of thyroid extract be given during and after the gestation.

In primary Graves disease with favorable circumstances, adequate treatment, only little intoxication and in the absence of cardiac and other complications, a prospect of a pregnancy may be entertained. Should conception occur one cannot overestimate the importance to take every precaution to insure a full-term pregnancy.

In secondary Graves disease the prognosis appears to be even less satisfactory.

H. C. HESSELTINE.

Ronsisvalle: Congenital Goiter in a Fetus Born from a Mother with a Goiter. Arch. ostet. e ginec. **17:** 319, 1930.

The author describes a case of true hereditary congenital goiter. The fetal goiter was amply demonstrated by histologic slides. However, examination of the goiters of mother and fetus revealed differences: The goiter of the mother presented glandular acini of various form and size, filled with colloid. In certain places the connective tissue was scarce, in others abundant, while still in other places there was marked hyalinization of the fibrous tissue. The goiter in the fetus showed a pallid reticulated tissue with glandular formations and large capillary vessels. The glands had a cuboidal epithelium of various form with no signs of secretion.

This difference is thus explained by the author: Since the thyroid is an important regulatory organ of metabolism, diminished function of the maternal gland will affect the thyroid anlage in the fetus. This might be interpreted as the hereditary factor determining the development of all the varieties of fetal goiter, depending upon greater or lesser sensibility of the cellular elements to formative stimuli.

SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

Gudernatsch, F.: The Administration of Thyroid Before and During Pregnancy and Its Effect on the Offspring. Monatschr. f. Geburtsh. u. Gynäk. **88:** 161, 1931.

The results of experiments with thyroid feeding which were begun in 1914 are reported by Gudernatsch. He found that when the dose of thyroid which was administered to animals was too large, symptoms of hyperthyroidism appeared such as loss of weight, diarrhea, muscular weakness, and finally cachexia and death resulted. When the dose was so regulated that the animals continued in good health they remained sterile. Conception did not occur until many weeks after thyroid administration was discontinued. In the patients where impregnation took place, one of three things occurred namely, abortion, death of the offspring shortly after birth, or in later pregnancies the young showed a tendency to retardation in growth in spite of the fact that they did not appear weak.

J. P. GREENHILL.

Nevinny and Schretter: Diabetes and Pregnancy. Arch. Gynäk. **140:** 395, 1930.

The authors describe their studies on two mildly diabetic women throughout pregnancy and the puerperium. In both instances there was a marked postpartum increase in the severity of the diabetes. Both babies were unusually large and stout, being 5730 and 4750 gm. in weight and 61 and 58 cm. in length. One baby died on the twenty-eighth day, the autopsy showing a pleurisy, a bronchopneumonia and congenital heart disease. The second baby died on the thirty-second day of congenital heart disease. The blood sugar of one child was 52 mg. per 100 c.c. of blood shortly after birth and then rose to 172 mg. where it remained until death. The maternal blood sugar in the diabetic parturient rises above the average during delivery as it does in the normal nondiabetic but does not drop promptly after delivery. On the contrary it continues to rise up to 50 per cent for eight to twelve hours.

There is a difference of 28 per cent in the blood sugar of the umbilical artery blood and the umbilical vein blood. The retroplacental blood shows the same amount of sugar as does the umbilical vein blood. Blood from the maternal basilic vein shows a higher sugar content than does the fetal or retroplacental blood. The sugar content of the liquor amnii is almost as great as that of the maternal blood.

RALPH A. REIS.

Haupt, W.: The Question of Interrupting Pregnancy Because of Status Epilepticus. Monatschr. f. Geburtsh. u. Gynäk. **83:** 16, 1929.

In half of all epileptic patients who become pregnant, the epileptic condition becomes aggravated. Only one-quarter show an improvement but this does not extend beyond the puerperium. The first appearance of epilepsy during pregnancy is rare. In 10 of the reported 19 cases of epilepsy associated with pregnancy death resulted. Most of the patients were treated conservatively. The author reports a case of his own where in the fourth month, the epileptic symptoms were suppressed by lumbar puncture and injection of air, followed by interruption of pregnancy and sterilization. The patient recovered. J. P. GREENHILL.

Glas, Rudolph: A Case of Taboparalysis, Malarial Treatment, Subsequent Labor. Zentralbl. f. Gynäk. **53:** 3458, 1929.

A forty-three-year-old primipara had been treated with malaria eight years previously for a progressive paralysis, although there had been no history of lues. She was seen in the psychiatric clinic during the present pregnancy because of suicidal tendencies, and blood and spinal fluid Wassermanns were found to be positive. Premature delivery occurred about the seventh calendar month, resulting in a 1320 gm. twin which died in twenty-nine hours and a 1500 gm. stillborn. The patient died subsequently from what seemed to be an intrapartum infection. A feature of the delivery was absence of pains except when the head passed the perineum. Strassmann reported a similar case, taboparalysis, resulting in delivery of a healthy child, and Weissmann has observed the birth of two healthy children from a mother who had received malarial treatment for progressive paralysis.

Despite the present case, the author believes the prognosis in subsequent pregnancies after malarial treatment to be good. WILLIAM F. MENGERT.

Bernardi: Postencephalic Parkinsonism and Pregnancy. Arch. ostet. e ginec. **17:** 273, 1930.

From the systematic study of a pregnant woman with a classical post-encephalic parkinsonian syndrome, observed for six months, the writer concludes: The pregnancy exaggerated the manifestation of the disease. No modifications were

observed in the reactions and morphologic components of the blood. Hyperglycemia which seems a characteristic finding in postencephalic parkinsonism failed to appear throughout the pregnancy. Scopolamine hydrobromide which had a marvelous therapeutic effect gave rise to a slight hyperglycemia. Changes in the electrolytic equilibrium of the blood lead to a slight hypopotassemia and hypercalcemia.

The patient was dismissed, cured by means of the medical therapy, and the child was free from any abnormality. SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

Bacialli: The Treatment of Fibroma in Pregnancy. Osp. maggiore di Novara **8**: 691, 1930.

The author discusses the technic of myomectomy on a pregnant uterus which does not greatly differ from that employed in the absence of pregnancy. To do this operation can be decided only after the abdomen has been opened. In some cases one is forced to perform hysterectomy.

The author favors this type of operative intervention, both for its immediate and remote effects. There is the possibility of removing a cause for abortion; there remains the chance for a new pregnancy. The sexual life of the patient will continue normally. SYDNEY S. SCHOCHET.
JULIUS E. LACKNER.

Phaneuf, L. E.: Myomectomy During Pregnancy. New England J. Med. **202**: 565, 1930.

Myomectomy during pregnancy is usually done for pain, aseptic necrosis, compression of bladder or rectum, torsion of pedicle, incarceration in front of the presenting part, and for incarceration of a retroflexed myomatous uterus. In this case the operation was required in the fourth month by severe and persistent pain. The amniotic sac was exposed for an area of about 5 cm. in diameter, but pregnancy went to full term. Disproportion between pelvis and head finally required delivery by cesarean section. HUGO EHRENFEST.

Item

AMERICAN BOARD OF OBSTETRICS AND GYNECOLOGY

GENERAL STATEMENT

The organization of this Board is the culmination of a determined effort on the part of the American Association of Obstetricians, Gynecologists, and Abdominal Surgeons, the American Gynecological Society, and the Section on Obstetrics, Gynecology, and Abdominal Surgery of the American Medical Association, to improve the standards of practice of obstetrics and gynecology in the United States and Canada, and to formulate a means of general discrimination between the truly qualified obstetrician and gynecologist, as contrasted with the self-styled "specialist."

The Board does not, by its Certificate, confer any special degree or license to practice obstetrics and gynecology, nor does it desire to inter-

fere with the professional activities of any regularly licensed physician. It does propose, however, to standardize qualifications for specialists in these branches, and to furnish certificates to those who comply with these requirements.

These are, in general terms, that one must have had a certain minimum amount of special training, must satisfactorily demonstrate his ability in the specialty, and must be limiting his work to the specialty according to a broad definition of this latter outlined in the booklet issued by the Board. An applicant's record and credentials are carefully scrutinized, a series of case records submitted by him are examined in detail, (except where men have specialized for more than ten years and have official hospital appointments during this time), and he is obliged to meet in person with the Board to undergo an oral and clinical bedside examination to demonstrate his ability.

These requirements are rigid and arduous but any well qualified obstetrician and gynecologist should have no difficulty in obtaining the certificate. Rigid requirements constantly maintained will make the certificate more and more valuable to its possessor. The present high standards of the Board and the desirability of its Certificate are attested by the distinguished list of Diplomates and there can be no argument for lower standards.

For further information regarding requirements, dates and places of coming examinations, and application blanks address the Secretary, Dr. Paul Titus, 1015 Highland Building, Pittsburgh, Pennsylvania.

ANNOUNCEMENT OF EXAMINATIONS

The next written examination of the American Board of Obstetrics and Gynecology will be held on Saturday, October 22, at 2 P.M., in 19 different cities of the United States and Canada (see announcements). In order to reduce traveling expenses for candidates special arrangement may be made through the Secretary for taking the written examination at any city other than those regularly specified where there is a Diplomate who can be empowered to conduct the examination. This arrangement does not apply to the general, clinical examination to be announced later. For further information address, Dr. Paul Titus, Secretary, 1015 Highland Building, Pittsburgh, Pennsylvania.

Errata

In the May number of the Journal, page 761, there appeared a case report by Dr. Sol. Litt. Through error in transmitting this report the names of Dr. Julius Lackner and Dr. Lester E. Frankenthal, Jr., were omitted as co-authors.

The title as corrected should read: Drs. Julius Lackner, Lester E. Frankenthal, Jr., and Sol. Litt reported a case of Double Uterus.